The Impact of Experiential Avoidance in Trauma Encoding.

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Project Overview.

This project is presented in three parts. Part one is a review of the literature regarding emotion regulation and its role in trauma processing. Overall, it is argued that the suppression of emotional experience in trauma can have maladaptive consequences and that acceptance may be a more adaptive alternative. The need for further research is however highlighted. Part two consists of an empirical paper which explores how trait levels of experiential avoidance (i.e. a global tendency to evade unwanted internal experience) might impact upon the development and maintenance of Posttraumatic Stress Disorder (PTSD). This section follows an experimental design and is based on the reactions of 45 healthy volunteers to an analogue trauma induction. In general the paper provides some support for the theory that acceptance rather than avoidance may be of benefit in the context of PTSD. Finally, part three considers the findings of the empirical paper in greater detail, particularly with regard to their potential clinical implications and associated methodological limitations; personal reflections on the research process are also offered.

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Part 1: Literature Review.

Emotion Regulation and its role in trauma processing.

Abstract.

The regulation of emotion is central to human functioning and may play a particular role in the processing of traumatic material. This review provides an outline of the empirical literature surrounding emotion regulation. It then considers this research in relation to the continuum of experiential avoidance, which ranges from the evasion of unwanted internal experience to its non-judgemental acceptance. The main models of Posttraumatic Stress Disorder (PTSD) are then introduced and the insight they provide into emotion regulation in the condition is considered. Finally the relationship between experiential avoidance and PTSD is explored and suggestions for future research are made.

1. Introduction.

Regulation of the experience and expression of emotion is pervasive in everyday life and not only influences how people feel but also what they remember and how they relate to others (Gross 1988, 2001). It is speculated that such regulation may play an important role in psychopathology (Berenbaum, Raghavan, Vernon & Gomez, 2003) and could be of particular relevance when individuals are exposed to a traumatic event. This is because following a trauma, an individual's feelings, their memories for the event and their relationships with others may all play an integral role in the development or otherwise of subsequent difficulties. The role of emotion regulation in the clinical field is however yet to be examined in detail. Instead, experimental psychology has focussed on the regulation of emotion in healthy participants (e.g. Gross, 1998) and clinical research has largely prioritised the regulation of cognitions (e.g. Ehlers & Clark, 2000).

This review will evaluate current understanding of the role of emotion regulation in trauma processing. It will begin by outlining the meaning of emotion and the developing appreciation within the literature of emotion regulation and its clinical application. The continuum of experiential avoidance in relation to such regulation will then be introduced, and the position of emotional suppression and emotional acceptance at opposite poles of this avoidance dimension will be delineated. This comparison will be later framed within the understanding provided by approaches such as Mindfulness, Acceptance and Commitment Therapy and Dialectical Behaviour Therapy, all of which posit emotional acceptance rather than suppression as central to psychological well-being.

Emotion regulation in the context of trauma encoding will subsequently be explored and a number of models of the disorder will be outlined. Where available, empirical data regarding emotion processing in PTSD will be presented. However research in this field inevitably raises ethical questions, particularly in relation to naturalistic studies which have high ecological validity but which may expose potentially traumatised individuals to further damage. With this in mind, the current review will also examine analogue experimental designs which serve as a good basis from which to build the more logistically demanding naturalistic research. This will involve a comparison of the impact of state emotional suppression and state emotional acceptance in PTSD. Areas for future research will finally be considered and the potential importance of trait as well as state differences in experiential avoidance when regulating trauma-related emotions will be highlighted.

Overall, the current review will argue that existing approaches to PTSD have prioritised the role of cognitive regulation and have largely underspecified that of emotion regulation, which may be of equal significance. In this regard, the review will note the importance of extending experimental methodologies to studies of emotion within trauma and trauma analogue situations. In addition, ideas for greater breadth in the modelling of PTSD will be discussed. This could incorporate developing the distinction between effortful and automatic emotion processing and elaborating the potential difference between trait and state emotion regulation skills. It will further be argued that models of PTSD might extend their understanding of emotion during the retrieval of a traumatic event to that of emotion processing when encoding the event itself.

1.1 Search Strategy.

The databases PsycINFO, CINAHL, EMBASE and the search engine Google Scholar were searched for the terms 'Posttraumatic Stress Disorder', 'emotion regulation', 'experiential avoidance', 'suppression' and 'acceptance.' Synonyms identified through the EMBASE thesaurus function were incorporated into each search. The articles were restricted to English language but were not limited by year of publication. The online bibliographic search was complemented by identifying relevant articles from the reference sections of selected papers.

2. Emotion and its regulation.

Human emotions form a complex system of interrelated physiological, behavioural and subjective components which have evolved to organise an individual's response to internal or external events (Kring & Werner 2004; Gross & Levenson, 1993). There is increasing awareness that humans have the capacity to regulate their emotions so that, when ill-matched to a given situation, they can be adjusted to better serve their goals (Rottenberg & Gross, 2003). For example, when told an anecdote, one might typically feel amused and laugh, however within the context of an important meeting, this response can be regulated by focussing on the serious subject matter and/or maintaining a neutral facial expression.

2.1 A model of emotion regulation (Gross, 1998).

The Gross (1998) emotion process model provides an informative framework from which to understand the strategies employed in regulating emotions. The model

explores the effortful control of emotion wherein "inhibitory responses are recruited and then pitted against ongoing emotional responses" (Gross & Levenson, 1997, p96). It further differentiates between emotion regulatory processes along the timeline of the emotional response, distinguishing antecedent and response focussed strategies and arguing that these have different adaptive, and sometimes maladaptive, consequences. According to the model, antecedent strategies are activated before the emotion-response has developed and involve construing a situation in a way that changes its emotional impact by either avoiding it, attributing a different meaning to it or attending to aspects of it that are more or less emotionally arousing. Response-focussed strategies on the other hand are instigated after emotion-response tendencies have been generated and involve suppressing or enhancing the physiological, experiential or behavioural aspects which constitute an emotion. Cognitive reappraisal (construing a potentially emotion eliciting situation in a way that changes its emotional impact) and expression suppression (inhibiting ongoing emotion-expressive behaviour) are examples of antecedent and response focussed strategies respectively and, as they are amenable to analysis, have formed the basis of empirical validation of the model.

In an influential study, Gross (1998) explored the affective consequences of reappraisal and expression suppression by instructing participants to reappraise while viewing an emotion inducing film or to suppress their expression of emotion, such that others would not know they were feeling anything. In both these conditions, he identified that participants displayed reduced emotion-expressive behaviour compared to a control group. However, those in the reappraisal condition actually decreased their subjective emotional experience while those in the expression suppression condition did not but instead experienced increased bodily emotional response in the form of higher

overall sympathetic activation. The latter finding suggests a physiological cost of expression suppression and was explained as due to the effort required in actively inhibiting the display of emotion (Gross & Levenson, 1997). This pattern corroborated that of other studies where Gross and Levenson (1993; 1997) showed participants films which elicited disgust, sadness and happiness, and again found that those in the expression suppression condition demonstrated reduced emotion expressive behaviour but, in the context of disgust and sadness, no effect on the experience of self-reported emotions. In these experiments, behavioural suppressors also displayed increased arousal indexed by greater sympathetic nervous system activity. The exception here was decreased heart rate, which Gross and Levenson (1997) argued may be due to the diminished movements made by those instructed to behaviourally suppress.

2.1.1 The consequences of emotion regulation for memory and social functioning.

The regulation of emotions via expression suppression or reappraisal has also resulted in different consequences for memory. For example, Richards and Gross (2000) identified that participants instructed to suppress their expression of emotion showed memory impairment for social information about images of injured men, while the memories of those instructed to reappraise were not hindered. In addition, Richards, Butler and Gross (2003) found that romantic partners instructed to conceal facial and vocal emotional cues while discussing a point of relational conflict had diminished memory for their conversation compared to partners who received no such instruction. It has been argued that the memory consequences of expression suppression in both these experiments is associated with diversion of the participants' finite attentional resources

to reducing the discrepancy between their 'desired' and their 'actual' public appearance (Richards, 2004).

Further studies have examined the social consequences of expression suppression finding that those allocated an emotionally suppressing 'stooge' as a partner with whom to discuss their experience of viewing an upsetting film experienced more stress (indexed by increased blood pressure) compared to those paired with a reappraising 'stooge' (Butler at al. 2003).

The aforementioned research suggests that expression suppression is a less adaptive way of dealing with emotional material than alternative forms of regulation, such as reappraisal. This has been corroborated by a series of studies (see Gross & John, 2003) which examine individuals who, rather than being instructed to suppress their emotional display, actually have a trait disposition to do so. These studies identified that trait suppressors are less well liked, have poorer social support, higher levels of negative affect, lower levels of positive affect and decreased well-being. While those who habitually reappraise experience an increase in positive emotion, a decrease in negative emotion, good interpersonal functioning and greater well-being.

It would appear then that individuals differ in their use of expression suppression and reappraisal and these differences are substantial and meaningful. With regard to interpersonal functioning, it is possible that expression suppression masks important social signals that would otherwise be available to social interaction partners and that monitoring one's own facial expressions (in an attempt to suppress them) may make an individual less responsive to the emotional cues of their social partner (Butler et al., 2003).

In summary, while both cognitive reappraisal and expression suppression aim to reduce negative emotions, these studies demonstrate that there is less cost for reappraisal compared to expression suppression, both in experimentally induced conditions and in measurements of trait disposition.

2.1.2 Limitations of the emotion regulation model.

Gross et al.'s work has played a crucial role in systematising emotion regulation. Its division of emotion processing strategies into antecedent and response focussed may however be problematic (Dunn, 2004). Reappraisal, for example, is considered an antecedent strategy; yet it is possible one might appraise before an emotion is experienced *and* while it is taking place. Furthermore, expression suppression may not be limited to the emotion response phase, since emotion may both be experienced, and hence suppressed, in anticipation of an event as well as during it.

In addition, in Gross's experimental manipulation studies, achievement of a clean divide between those instructed to suppress and those allocated to reappraise may not have been achieved. Instead, individuals may have used their trait predisposition to reappraise to aid their attempts to suppress emotion expression and vice-versa. This would have inevitably influenced experimental findings but was not controlled for in any of the experimental work.

With regard to ecological validity, the Gross studies (e.g. 1993, 1997 & 1998) used video sketches to induce an emotional reaction. However, these sketches were quite distinct from those an individual might confront in their daily life (e.g. a slap-stick comedy and the graphic portrayal of medical procedures). It is arguable that the validity

of Gross's research would therefore be enhanced through the introduction of more naturalistic emotion-eliciting material.

Furthermore, the existing model does not account for cultural norms in emotion regulation. In this regard, Butler, Lee and Gross (2007) have identified that American women with Western values use expression suppression less frequently and associate it with negative emotional experience while the converse is true of those with Asian values.

Finally, Gross's studies of emotion suppression consider inhibition of the physical expression of emotion to the exclusion of internally experienced affect. Yet the consequences of suppressing internal affect may be different and indeed more marked, and it is probable that the internal experience of emotion is a greater source of concern to the individual than the external expression (e.g. Barlow, Allen & Choate, 2004).

Gross and colleagues' model would be advanced by further validation controlling for the aforementioned limitations. In spite of this, it remains the first to draw an explicit distinction between strategies of emotion regulation and it continues to provide a valuable framework with which to understand the consequences of effortful emotion regulation and the impact of long-term emotion regulation strategies on general wellbeing.

3. The experiential avoidance continuum.

3.1 Acceptance and the experiential avoidance continuum.

In contrast to suppression, emotional acceptance requires an individual to remain fully in contact with their emotions, thoughts and bodily sensations even if they are

uncomfortable doing so (Hayes, Wilson, Gifford, Follette & Strosahl, 1996). It is broadly seen as an adaptive way of coping with emotional difficulties, which involves non-judgemental awareness of experience rather than attempts at control.

Comparison of acceptance and suppression is perhaps best achieved by conceptualising the two forms of regulation along a continuum of experiential avoidance (EA), which can be defined as "the phenomenon that occurs when a person is unwilling to remain in contact with particular private experiences and takes steps to alter the form and frequency of these events and the contexts that occasion them" (Hayes et al, 1996, p1154). People who have high levels of this trait commonly manage their emotions through suppression and other control tactics, including attempts to escape stressful experiences and to avoid negatively evaluated private events, whereas people who have low levels of EA tend to simply accept their internal experiences (Kashdan, Barrios, Forsyth & Steger 2006).

3.2 Clinical application of the experiential avoidance continuum.

An EA continuum is a useful tool in extending the examination of emotion regulation in normative psychological approaches (e.g. Gross, 1998) to the study of clinical disorders. According to Hayes et al. (1996), high EA is a counterproductive form of emotion regulation, associated with increases in negative affect (e.g. Feldner, Zvolensky, Eifert & Spira, 2003; Kashdan et al., 2006). The argument here is that psychological difficulties stem from attempts to suppress particular thoughts and feelings rather than from the thoughts and feelings themselves. One form of EA, thought suppression, provides a particularly useful example of this and is posited as a maintaining factor in a number of clinical disorders because of its association with an

'ironic rebound effect' wherein attempts not to think a thought often create that very thought itself (Wegner, Schneider, Carter & White 1987). This form of suppression has been a fruitful area of experimental research (see Purdon, 1999) and its impact has been linked to affect in that participants asked to suppress a thought while in a specific mood show a greater rebound effect when subsequently in that same mood. It has further been demonstrated that the rebound of a suppressed thought will come to produce the mood that was experienced at the point of suppression (Wenzlaff, Wegner & Klein, 1991). This link between thought suppression and affect implies the kind of vicious circle found in many clinical disorders wherein moods and thoughts are mutually reinforcing (Hayes et al., 1996).

Generalisation of the thought rebound effect to other areas of human responding has been noted in a recent paper by Masedo & Esteve (2007). Here it was identified that participants instructed to suppress while undergoing a cold pressor task showed less tolerance for pain than those instructed to accept. They further showed a rebound in reported physical discomfort during a recovery period, indicating that thought rebound has an analogue in the subjective experience of somatic pain. Following the same rationale, it can be hypothesised that emotion suppression might produce an emotion rebound effect which may in turn form part of the aforementioned vicious cycle associated with clinical disorder.

3.2.1. Empirical study of experiential avoidance.

A number of empirical studies have supported the clinical application of EA, for example, high EA has been found to correlate with depression and anxiety (Hayes et al., 2004) and to mediate the relationship between childhood sexual abuse and psychological

problems (Marx and Sloan, 2002). It has also been associated with greater emotional distress and more negative cognitions about emotion provoking procedures such as biological challenges (Feldner et al,. 2003). For example, in an experiment involving inhalation of CO_2, non-clinical participants who endorsed greater EA reported more symptoms of panic but displayed comparable levels of physiological arousal to those low on this trait, suggesting that EA is related to how bodily arousal is experienced, rather than reflective of actual physiological arousal patterns (Feldner et al. 2003). A similar study further identified that those participants instructed to accept emotions prior to breathing CO_2 experienced less fear and less catastrophic thinking and were less likely to terminate the experiment than those instructed to suppress (Eifert & Hefner, 2003); a finding that was further replicated in individuals with panic disorder (Levitt, Brown, Orsillo & Barlow, 2004).

More recently, Kashdan et al. (2006) have investigated the role of EA as an aetiological and maintaining factor in anxiety disorder. Here, the authors define EA as a broad construct, entailing tendencies towards psychological inflexibility across contexts. They argue that it is just such inflexibility which leads those high in this trait to make constant attempts to control unwanted private events such that contact with moment to moment experience is reduced and progress towards personally meaningful goals ceases. Within their research, Kashdan et al. (2006) used a correlational design based on the findings of self-report measures and identified that EA mediates the impact of maladaptive coping and emotional response styles on anxiety-related distress. In this regard they argued that unhelpful coping strategies, such as rumination, do not yield functional impairment in themselves, but rather difficulties develop when such strategies are applied inflexibly and with insensitivity to context.

In the same paper, Kashdan et al. (2006) further examined the relationship between EA, emotional expression suppression and cognitive reappraisal with participants' daily reports of social anxiety. Here they found that EA was inversely related to positive affect and life satisfaction, and was positively related to negative affect and social anxiety. They also identified that all the relations between emotional expression suppression and unhealthy functioning and to a lesser extent, cognitive reappraisal and healthy functioning, were fully mediated by the EA trait. As a result of this research, Kashdan et al. (2006) concluded that individual differences in EA are associated with anxiety-related pathology and diminished positive psychological functioning, and that EA is a barrier to deriving meaning from life and working towards more valued goals. This research provides a valuable contribution to developing understanding of the clinical application of EA, it nevertheless suffers from the difficulties in determining causality that are inherent in all correlational designs and from the problems of experimenter demand effect associated with self-report measurement.

3.3 Comparison of high and low experiential avoiders (Sloan, 2004).

One of the few studies to have made a direct comparison between those high and low in trait EA is that of Sloan (2004), who compared the self-report and psychophysiological responses of healthy volunteers who habitually avoid their internal as well as external affect with those of individuals who do not. In this research, high and low avoiders were shown a range of emotion eliciting stimuli in the form of pleasant and unpleasant films. Since EA is associated with emotion regulation in relation to aversive thoughts and feelings, Sloan (2004) anticipated that, in the context of unpleasant stimuli,

those high on this trait would report heightened subjective experience of emotion without a difference in physiological reactivity (following Feldner et al., 2003), while no group differences would be identified in response to pleasant stimuli. Contrary to expectations, the study found that high experiential avoiders reported elevated emotional response to footage with a high arousal value regardless of its valence.

In terms of physiological response, the high EA participants displayed reduced heart rate reactivity to the unpleasant films relative to the low EA participants, and no difference in facial electromyographic reactivity. Sloan (2004) claimed that the attenuated heart rate of avoiders reflected an attempt at emotion regulation that may not have been identified by Feldner et al. (2003) because of the unusually high baseline heart rate of their participants. She further contrasted her results with those of Gross (1998) which found state emotional suppressors display increased sympathetic activation when presented with arousing material (see section 2.1). Here, Sloan (2004) claimed that for trait (but not state) avoiders, emotional suppression has become an effortless, automatic process and hence a pattern of increased heart rate is not observed. A more recent study into spontaneous emotion regulation during evaluated speaking tasks did however show that automatic emotion regulation can have similar consequences to the effortful, experimentally induced kind. Here, trait suppressors showed greater physiological responding to the stressor than trait reappraisers (Egloff, Schmukle, Burns & Scherdtfeger, 2006).

3.3.1 Limitations of the Sloan (2004) research.

The Sloan (2004) study provides a valuable extension to the work of Gross and colleagues and to that of Feldner et al. (2003). However, there are a number of ways in

which it might be extended. For example, the Gross studies frequently identified increases in skin conductance (GSR) during experimentally induced emotional suppression (e.g. Gross, 1998). An examination of the GSR for those high and low on trait, rather than state, EA would therefore be suggested. In addition, Butler et al. (2003) noted that those instructed to suppress their emotions may carry a greater cognitive load which interferes with their memory for the presented material. It would again be worthwhile establishing whether this continues to be the case when individuals are compared according to their trait EA measures. Finally, while Sloan (2004) determined that the film clips used for the trial elicited the stated emotions (see Gross & Levenson, 1995), those chosen were not reflective of the emotional incidents regularly encountered in everyday life and may therefore suffer from the difficulties in ecological validity encountered in the Gross research (see section 2.1.2).

In spite of these limitations, the Sloan (2004) paper expanded Gross's idea of suppression to include avoidance of internal as well as external affect. Her definition of EA is thus associated with a global down regulation of affect and may therefore be a more meaningful emotion regulatory goal in terms of an individual's experience- particularly when encoding trauma. This down regulation might be achieved by a range of different strategies but nevertheless results in the individual 'feeling less'.

3.4 Summary of the experiential avoidance research.

In summary, the EA continuum serves as a valuable means of comparing emotional suppression and emotional acceptance and appears to have relevance to the understanding of psychological problems. In this regard, existing research in the field has suggested that high EA can be detrimental to psychological health in a number of

ways. For example, when compared to individuals low on EA, high experiential avoiders report greater levels of distress at the experience of bodily arousal (Feldner et al., 2003) and greater emotional response to arousing material (Sloan, 2004). Furthermore, the inflexibility associated with high EA means that unhelpful coping strategies are more rigidly applied to psychological difficulties and can become a barrier to working towards valued life goals (Kashdan et al., 2006).

While theoretically interesting, the aforementioned research would benefit from both extension and replication, particularly as there is variability in some of the findings (e.g. the physiological response of high experiential avoiders to arousing material: Sloan, 2004; Egloff et al., 2006). For this reason, any conclusions drawn regarding the application of an EA continuum to clinical work must remain tentative.

4. Acceptance based therapies.

In spite of the need for caution in applying the above research findings to clinical practice, there remains a long-standing heuristic belief that the chronic avoidance of emotion is problematic. This belief is implicated in many therapies. Psychoanalysis, for example, has as its key purpose the bringing of painful or threatening material into conscious awareness (Freud, 1961). The Rogerian approach also promotes openness and a non-judgmental attitude to emotional experience (Rogers, 1961), and Gestalt therapists view psychological dysfunction as closely associated with the avoidance of painful emotional states (Greenberg, 2004). Traditional Cognitive Behavioural Therapy (CBT) further considers emotional avoidance damaging to psychological well-being but prioritises changing in addition to discovering private experience. In CBT such change

takes place through a process of challenging unhelpful thoughts and assisting the client in the identification of more helpful alternatives.

The role of emotion recognition and expression has formed the basis of a third-wave of cognitive behavioural therapeutic models, such as Acceptance and Commitment Therapy (ACT). As with other acceptance based treatments, ACT places the recognition and management of high EA explicitly centre stage. In this regard, the therapy attempts to modify the impact of emotions and cognitions by altering the struggle with them rather than by changing their form, frequency or situational sensitivity (Hayes et al., 1996). The approach is based on an understanding that traditional cognitive behavioural therapies may have overemphasised the importance of changing all unpleasant symptoms without recognising the value of acceptance. Such a stance is supported by component analyses which have failed to identify cognitive change as a mediator of response to therapy and by studies which have found CBT treatment gains to be based on the alteration of cognitive processes rather than content (Teasdale et al., 2001).

4.1 Acceptance and mindfulness.

Acceptance based therapies are linked closely with the Buddhist practice of mindfulness. Mindfulness, like acceptance, involves welcoming internal experience rather than pushing it away. It is a present moment, purposeful and non-judgemental form of enhancing attention and awareness (Martin, 1997) and can be contrasted with mindlessness which is associated with automatic thinking, rumination and divided attention.

Therapies that include mindfulness as a central component are Mindfulness based stress reduction (Kabat-Zinn, 1991), which is shown to reduce anxiety and pain

and to be clinically effective, and Dilectical Behaviour Therapy (Linehan, 1993) which fosters improvements in affect tolerance and is shown to reduce self-harm (Gunderson & Hoffman, 2005). Additional mindfulness therapies include Mindfulness Based Cognitive Therapy (Segal et al. 2002), which trains participants to disengage from negative rumination and reduces relapse in chronic depression for those with more than three depressive episodes; and the aforementioned Acceptance and Commitment Therapy (Hayes, Strosahl & Wilson, 2003).

A range of possible mechanisms have been proposed to account for the effectiveness of mindfulness approaches, one of which is that mindfulness leads to symptom reduction via exposure to emotion or pain without avoidance. Such mindful exposure is thought to extinguish an individual's fear response and thereby improve both how they tolerate negative emotional states and their ability to cope (Baer, 2003). For example, in an acceptance-based protocol for anxiety disorders, Eifert and Forsyth (2005) see exposure as a willingness to continue working towards meaningful life goals in the presence of anxiety, rather than a technique specifically aimed at reducing that anxiety. A further potential mechanism for mindfulness-based change is that of learning to decentre from thoughts and to recognise them as transient mental events rather than direct representations of reality (Melbourne Academic Mindfulness Interest Group, 2006). This process arguably leads thoughts to be experienced as less distressing and does not necessitate escape or avoidance behaviours.

Research into the concepts of acceptance and mindfulness is growing yet their direct value in relation to therapeutic approaches and the mechanisms by which they account for therapeutic change remain largely untested. Consideration of acceptance in relation to trauma (see section 8) may therefore serve as a useful addition to this field.

5. A taxonomy of emotion regulation (Berenbaum et al., 2003).

In addition to the aforementioned distinction between suppression and acceptance based approaches to emotion regulation, Berenbaum et al's (2003) taxonomy of emotions shows the potential heuristic value of a more general emotion regulation perspective in understanding common mental health difficulties.

Their taxonomy of maladaptive emotional responses is based on the theory that an individual's well-being is impaired when the emotion system is disturbed and operates in such a way that adaptation is impeded. It defines three different ways in which emotions may be disturbed: emotion intensity/regulation disturbances (characterised by emotional responses that are consistently too strong or too weak, regardless of the emotion involved), emotion valence disturbances (defined on the basis of the relative quantity of pleasant versus unpleasant emotions) and emotion disconnections (disconnections between different aspects of the emotion system such as between facial expression and subjective experience, and difficulties in emotion awareness found in conditions such as alexithymia).

Berenbaum et al. (2003) speculate that the majority of mental health problems can be described in terms of these emotion disturbances and that their taxonomy could complement existing psychiatric classification systems such as the DSM-IV (APA, 1994). Consideration of depression provides an example of how the taxonomy could be employed. In this regard, depression may be defined as a disturbance in emotional valence of the predominantly unpleasant type. As such, individuals have an excess of unpleasant emotions such as sadness or guilt and/or a deficit in pleasant emotions such as happiness and pride. The unpleasant feelings experienced in depression may further be excessive in intensity or duration and/or there may be affective flattening, indicating

a disturbance of hyper or hypoemotional reactivity. Inclusion of the taxonomy in addition to the existing DSM-IV classification serves not only a descriptive function but, Berenbaum et al. (2003) argue, also offers a guide for subsequent therapeutic work.

5.1 Limitations of Berenbaum et al.'s (2003) taxonomy.

According to Berenbaum and colleagues, the diffusion of their taxonomy would lead emotion disturbances to become phenomena worthy of study in their own right rather than simply corollaries of other psychopathological conditions. However, as they acknowledge, the role of their taxonomy is simply to describe the outcome of disruption in the emotion system rather than the mechanism by which the disruption came about (Rottenberg & Gross, 2003). Furthermore, the dimensions that they describe have not received any detailed empirical examination and may not best capture emotional experience. For example, Watson (2003) argues that there is little evidence for a predominantly pleasant emotion disturbance associated with an excess of pleasant emotion in psychopathology and, as such, an emotional valence dimension may be misleading. In addition, the taxonomy does not emphasise the behavioural aspects of emotion such as behavioural avoidance, nor does it consider cognition or physiology, all of which are major emotion response systems.

In spite of these limitations, the fact remains that highly emotive events are implicated in a number of forms of psychopathology, such as PTSD and adjustment disorders (Dalgleish & Power, 2004), and Berenbaum et al.'s (2003) taxonomy highlights the importance of taking an emotion regulation perspective when attempting to understand such psychological problems.

6. Summary of the emotion regulation literature.

Thus far it has been shown that effortful EA, in the form of experimentally induced expression suppression of emotion, is an ineffective way of managing distress that has consequences in terms of increased physiological arousal and no change in self-reported emotional experience (Gross, 1998). It has further been noted that automatic EA, examined through individuals who habitually avoid their internal as well as external affect, is associated with greater emotional response to distressing material (Sloan, 2004) and reduced flexibility in coping with psychological difficulties (Kashdan et al., 2006). It's association with physiological responding however merits further exploration, with some experimenters identifying a link with reduced physiological response (Sloan, 2004) and others with increased (Egloff et al., 2006).

The existing studies of trait and state emotion regulation offer some distinction between effortful and automatic emotion processing skills. However, they have yet to be incorporated into a unifying model. In this regard, the Gross (1998) emotion process model identifies suppression as a response-focussed emotion processing strategy, but says little about acceptance and does not explicitly distinguish effortful and automatic emotion regulation techniques. The Berenbaum et al. (2003) taxonomy further delineates emotional valence, intensity and disconnection but makes no explicit reference to EA. Here, high EA could be usefully associated with muted emotional intensity and disconnections in emotion awareness. Extension of the taxonomy could also distinguish between trait and state emotion regulation strategies and thus identify whether EA in a particular clinical case is effortful, automatic or contextually flexible.

Emotion regulation is arguably a complex construct and the drawing together of these experimental findings and of existing emotion models may offer a means of

supporting the widely held therapeutic understanding, which forms the basis of acceptance based therapies, that high EA is a less psychologically adaptive emotion processing strategy than low EA.

7. Emotion regulation and Posttraumatic Stress Disorder (PTSD).

Consideration of emotion regulation in the context of PTSD is of theoretical and clinical relevance. This is because therapists and researchers alike tend to see the avoidance of negatively evaluated internal experience as the mainstay of the disorder. Understanding PTSD and how emotional processing is modelled within it, as well as exploring existing research into EA and trauma symptoms, would therefore allow greater consideration of this posited EA - PTSD link.

A diagnosis of PTSD is associated with feelings of 'intense fear, helplessness or horror' (APA, 1994, p428) during exposure to a traumatic event, in addition to symptoms in three core areas that are experienced once the stressor is over. These include a *re-experiencing* of the original trauma in the form of intrusive images, thoughts, nightmares or flashbacks; *avoidance* of cues associated with the trauma through social withdrawal or detachment, and *increased arousal* in the form of greater irritability, poor concentration and hypervigilance. While all of the aforementioned symptoms are not necessary for diagnosis, the universal element present in every case is the experience of strong emotion, as evidenced in the feelings associated with the index event (Wastell, 2002). Indeed, emotion-based features are interweaved with each of the core PTSD symptom areas and include "irritability, anger, physiological reactivity, distress, anhedonia and a restricted range of affect" (Kring and Werner, 2004). Viewed within the framework of Berenbaum et al. (2003), the emotional numbing in PTSD, may

also be seen as an example of an emotion intensity/regulation disturbance which stems from an individual ceasing to attend to some or all of their concerns and goals.

Not all individuals exposed to a traumatic event go on to experience PTSD. Indeed the probability of developing the disorder after exposure to a trauma varies between 9% and 24% (Breslau et al., 1998; Breslau, Davis, Andreski & Peterson, 1991; respectively) depending on the criteria applied. A number of mediating variables are associated with subsequent difficulties, these include previous psychiatric history, trauma event severity, the personal nature of the stressor, cognitions and appraisals experienced at the time of the trauma (including mental defeat and dissociation), the nature of the support received and how the symptoms are integrated and interpreted by the individual (Dalgleish, 2004). Further demographic factors such as low socio-economic status, low educational level and female gender also have some bearing (Brewin, Andrews & Valentine, 2000).

In addition to the aforementioned mediating variables, the role of emotion processes in trauma is central both to the individual's response during the event and to the laying down of traumatic memory (Van der Kolk, 1997). This paper shall next consider the most influential psychological models of PTSD since these inform our understanding of how thoughts and feelings are interrelated in the disorder. These models have generally placed greater emphasis on the consequences of cognitive regulation than on emotion regulation. Nevertheless, where appropriate, consideration will be given to the insight that they offer with regard to the different emotion regulation strategies that an individual might employ during trauma encoding.

7.1 Models of PTSD.

7.1.1 The stress response model (Horowitz, Wilner, Kaltreider & Alvarez, 1980).

According to Horowitz et al.'s (1980) formulation of PTSD, difficulties arise when the images and memories that are associated with a traumatic incident cannot be successfully incorporated into an individual's current mental representations of themselves and of the world.

The assimilation of new trauma-related information into existing mental representations or the accommodation of these mental representations to hold the new material is described by Horowitz as a 'completion tendency,' and difficulties with this process are seen as a 'failure to complete'. According to the model, 'failure to complete' is a result of the activation of psychological defence mechanisms which serve to keep traumatic material in the unconscious and which result in numbing and denial and the maintenance of trauma-related information in an 'active memory' system. Horowitz argues that because of the aforementioned 'completion tendency', the traumatic material in 'active memory' repeatedly breaks into conscious awareness in the form of re-experiencing symptoms, and the oscillation between this and the numbing associated with the defence mechanisms results in the individual being stuck in a PTSD-like state. According to the model, such a state continues until the traumatic material is cleared from 'active memory' and assimilated into long-term schematic representations.

The stress response model introduces an idea that has become central to many subsequent interpretations of PTSD, that schema incongruent information is problematic to processing. However, it is less clear how emotions fit into this schema-based theory. One interpretation is that the defence mechanisms in the model could be viewed as

emotion regulation strategies that are applied during initial encoding of the trauma and during subsequent re-experiencing.

Furthermore, it is not apparent how the process of schematic change takes place and how the mismatch between 'active memory' and schematic information is resolved. In addition, while the idea of an 'active memory' clearly has heuristic value, as Dalgleish (2004) notes, it is underspecified both in terms of the kind of mental representation it is and in terms of how it relates to existing cognitive theories of memory (e.g. Baddeley, 2000).

7.1.2 Associative Network Theory (Foa, Seketee & Rothbaum, 1989).

Associative network theory proposes a fear network account of emotion processing and argues that the way in which a traumatic event is processed and represented in memory contributes to the subsequent development of psychological problems. In particular, the theory codifies how trauma memories are laid down and explains the role of prolonged exposure as a form of treatment.

The model views the memory record of a trauma as embodied in an associative network in the long-term memory store. Information about the cognitive, behavioural and physiological reaction to the trauma form part of this network as do associations which link the trauma and the reaction together. The network is believed to be an unusually coherent and stable one which is easily activated when any of its elements is encountered (e.g. trauma reminders). Crucially it is during this activation that a person re-experiences the physiological reactions and interprets the world in the same way as they did during the trauma.

According to the associative networks model, individuals actively suppress the reactivation of the trauma structure due to the distress they associate with it. Within therapy, exposure is therefore used to allow fear-incompatible information to be incorporated into the memory trace and to enable a modification of the network so that it no longer causes distress to the individual.

With regard to emotional processing, the network theory accounts for the automatic emotions that individuals experience following trauma, however appraisal driven emotions, such as those associated with an individual's underlying schemas (Dalgleish, 2004) are less well explained since these rely on more than a simple associative connectivity between elements. Furthermore, the suppression associated with reducing reactivation of the trauma is arguably underspecified and a more detailed emotion regulation perspective would therefore be a valuable addition to this model.

7.1.3 The Cognitive Model (Ehlers & Clark, 2000).

Ehlers and Clark devised a model of PTSD which prioritises cognitive regulation strategies and in which affect is seen to be shaped by cognition. This model examines how previous experience of a trauma can lead to a sense of current and future threat, and argues that it is such ongoing threat which results in the persistence of PTSD.

According to the model, there are individual differences in how people process traumatic events and their sequelae, with those who experience PTSD viewing a trauma as having global negative implications for their future life and holding an autobiographical memory trace for the event which is neither well elaborated nor well integrated with other information in their long-term memory store. The weak memory

trace that the model describes is believed to result in both poor intentional recall for the event and vivid unintentional re-experiencing (Halligan et al., 2002).

According to the model, the excessively negative appraisals of the trauma in conjunction with the disturbance of a clear autobiographical memory trace, lead to the aforementioned sense of current threat that mediates the development of difficulties. Ehlers and Clark (2000) argue that this sense of threat is maintained via problematic behavioural and cognitive strategies including thought suppression, behavioural avoidance, dissociation and distraction.

The inclusion of appraisals in the model highlights how different aspects of cognition impact on the disorder and on recovery from it, and the model as a whole explains why therapeutic work should involve both modifying these appraisals, elaborating the trauma memory and preventing continued use of dysfunctional coping strategies. With regard to emotion, Ehlers and Clark (2000) argue that emotional dysregulation is exacerbated by unhelpful attempts at symptom control which include the aforementioned thought suppression and behavioural avoidance.

7.1.4 Dual Representational Theory (DRT; Brewin, Dalgleish & Joseph, 1996).

Brewin et al. (1996) proposed a cognitive theory of PTSD that is based on multiple memory systems. According to their model, memories of a trauma are stored in different representational formats, Verbally Accessible Memories (VAMs) are those which can be retrieved either automatically or deliberately and which are part of a person's autobiographical understanding, containing information that they consciously processed pre, peri and posttraumatically. The Situationally Accessible Memory system (SAM), on the other hand, contains aspects of the lower-level perceptual processing of

the traumatic scene and of the person's reaction to it, for example visuo-spatial details and bodily response. This information has received little conscious processing and is more affect-laden than VAMs.

Brewin et al. (1996) argue that the heightened level of arousal associated with processing a trauma can lead to a failure to integrate these two memory systems such that an impoverished VAM and a strengthened SAM trace are established. SAM memories are then activated by reminders of the trauma, resulting in flashbacks and re-experiencing of the emotions entailed, such as helplessness, fear or shame. Furthermore, since the SAM system is non-verbal it cannot be controlled or contextualised within the VAM trace. The purpose of therapy is therefore to integrate the two memory systems and thereby consolidate the verbally accessible representation of the trauma in the long-term memory store. In this way, it can exert an inhibitory influence over the more distressing situationally accessible details.

DRT recognises that emotion processing is essential to recovery from PTSD and argues that the emotions associated with a trauma need to be processed within the VAM via the integration of verbally accessible information with pre-existing models of the world. In terms of the continuum of experiential avoidance, emotional suppression and emotional acceptance arguably influence the extent to which the two memory systems are established. In this regard, an impoverished VAM trace (linked with impaired episodic memory) and a strengthened SAM trace (linked with more intrusions) may be partly the consequence of emotional suppression in response to trauma, since this involves pushing distressing material out of conscious experience. In contrast, emotional acceptance might allow for strengthening of the VAM system and hence a more elaborated memory for the event.

7.2 Summary and critique of PTSD models.

Each of the above theories highlights the difficulty an individual may experience integrating a traumatic event into their existing understanding of the world. To differing extents the models have focused on the role of cognition in this integration process, and a common, but largely implicit, component of most of them has been the importance of attempts to avoid or control the experience of negative affect (i.e. experiential avoidance). While each theory has therefore implicated emotion regulation in the disorder's development, their understanding of such regulation remains somewhat underspecified and lacking in empirical validation. For example, investigation of emotion regulation and the EA continuum has highlighted a distinction between effortful and automatic emotion processing. Here, it has been identified that high EA has maladaptive consequences in both types of processing, but that these consequences are somewhat different (e.g. compare the physiological response findings of Gross, 1988 and Sloan, 2004). Each of the aforementioned PTSD models remains largely silent about this distinction; yet contrasting the two processing types may have useful clinical application. For example, it may allow therapists to explore whether individuals should be consciously trained to manage their emotion in specific ways (effortful processing), or whether work would be better placed to develop their pre-existing automatic emotion regulation strategies.

In addition, where emotion regulation is considered by the aforementioned models, the focus is largely on the retrieval phase of trauma. For example, the associative networks theory (Foa et al., 1989) accounts for the automatic emotions experienced following trauma by seeing these as triggered by trauma reminders that activate an coherent fear network. It may however be equally informative to consider

emotion regulation at the point of trauma encoding, since different types of regulation may be adaptive at different times. For example, emotion suppression during a trauma may allow resources to be more appropriately allocated to survival, whereas emotion suppression after the event may lead to the avoidance of appropriate feelings, a process which in the long-term may become pathological (Walser & Hayes, 1998).

Finally, as empirical work has demonstrated, it is possible to draw a distinction between state and trait emotion regulation. Yet existing theories of PTSD do not make this explicit. The distinction between the two may again be of clinical relevance, for example, certain trait emotion regulation approaches may be more protective than others when exposed to a potentially traumatic incident. Furthermore, the success of training individuals with PTSD in emotion regulation may be influenced by their trait ways of responding to a traumatic event and its aftermath. For example, an individual's ability to accept their emotional response may be interlinked with the degree to which they would naturally opt for such a regulation strategy.

The extension of experimental methodologies to studies of emotion within trauma and trauma analogue situations, in addition to consideration of the above factors, may allow for greater breadth in the modelling of PTSD which may in turn have implications for clinical practice.

8. Experiential avoidance and PTSD

8.1 Research into experiential avoidance and PTSD

The role of EA in the development and maintenance of PTSD is beginning to receive an increasing amount of research attention. Coping styles reflective of EA, such

as wishful thinking and attempts to suppress negative material have been associated with PTSD symptoms in a range of populations, including ambulance workers (Clohessy & Ehlers, 1999), motor-vehicle accident survivors (Nightingale & Williams, 2000), victims of assault (Valentiner, Foa, Riggs & Gershuny, 1996) and Vietnam veterans (Roemner, Litz, Orsillo & Wagner, 2001).

A substantial amount of research in this field has drawn on self-report data from populations with an abuse history. For example, Batten, Follette and Aban (2001) identified that individuals with a history of childhood sexual abuse used EA to a greater extent than those without; while Cloitre, Miranda, Stoval-McClough & Han (2005), noted that women with PTSD following a similar abuse history tended to experience difficulty regulating their emotions and that this contributed to their functional impairment to the same extent as their PTSD symptoms. In addition, a study by Tull, Gratz, Salters & Roemner (2004) revealed a positive correlation between EA and the severity of PTSD symptoms in women with a lifetime history of sexual assault. However in this study, EA did not predict PTSD severity above and beyond the number of potentially traumatic incidents reported by the women and the general severity of their psychiatric symptoms. Tull et al. (2004) therefore concluded that the relationship between EA and PTSD may be a result of the association of each with the severity of general psychological problems.

The hypothesis that EA predicts trauma related symptoms as a function of general distress was further supported by the findings of Plumb, Orsillo and Luterek (2004) who examined the relationship between EA and psychological functioning in participants with a more general trauma history. Here they noted that EA accounted for a significant portion of the variance of general psychological distress, but for less of the

unique variance of symptoms specifically associated with PTSD. They nevertheless added that the extent to which EA is employed following trauma predicts PTSD symptom severity over and above the severity of the trauma itself. This latter finding has been corroborated by Marx and Sloan (2005) in a longitudinal study which identified that EA significantly predicted symptom severity over time above and beyond PTSD symptom scores at baseline.

From each of these studies, it would appear that individuals who use EA as a means of coping following exposure to a traumatic event display greater impairment in psychological functioning than those who do not.

8.1.1 Limitations of the existing experiential avoidance research.

The aforementioned studies offer an important contribution to the research into EA in the context of trauma; however they suffer from a number of limitations. For example, each relies on self-report analyses from individuals with historical exposure to a traumatic event, yet it is possible that participants with such a history may experience difficulty openly expressing their views in self-report measures. Furthermore, if participants are high on trait EA, this may interfere with their actual awareness of symptoms and thus their ability to accurately report the extent of their engagement in EA strategies. One means of counteracting this difficulty would be to employ multiple methods of evaluation, including the use of psychophysiological recordings that are less susceptible to the effect of experimenter demand and inaccurate reporting.

Furthermore, the majority of the aforementioned studies are correlational in design and, while they claim that pre-morbid tendencies to EA may increase the likelihood of developing PTSD, it is also possible that PTSD-like difficulties may be

responsible for subsequent increases in the avoidance of internal experiences. Although logistically problematic, analyses which included measures pre and post trauma would provide some insight into this matter. This may be best achieved through studies involving measurement before and after a trauma analogue induction.

A further limitation of many of these studies is that they are based on recordings of traumatic events which may have occurred at any point during the participants' lifetime. Such retrospective reporting may mask important differences across participants since the effect of a traumatic incident arguably differs depending on the developmental stage at which it occurred. For example, where the event is linked to early childhood trauma, this may be manifest in the participant through a pervasive sense of distress, identified through measures of general psychological functioning, rather than through specific symptoms of PTSD. Such a relationship may partly explain the findings of Tull et al. (2004) and Plumb et al. (2004), who viewed EA as predictive of general distress rather than of specific PTSD symptomatology.

8.2 Experimental research into experiential avoidance and PTSD.

In recent years steps have been taken to extend the study of high EA to include more empirically based research designs. These have aimed to identify whether EA in trauma is associated with particular memory costs or with affective rebound, or indeed whether the type of emotion regulation taking place during trauma encoding increases or conversely decreases the probability of a PTSD-like reaction. These laboratory based designs have included both psychophysiological and self-report data and therefore address some of the limitations of the aforementioned questionnaire research (see section 8.1).

One recent study is that of Dunn (2004) who examined the consequences of experimentally manipulated internal feeling and external expression suppression by asking participants to follow emotion regulation instructions when viewing traumatic video footage. Dunn's (2004) results identified that suppression did not influence self-reported emotional experience during trauma induction, nor did it affect mood, response to subsequent emotional material, or the experience of intrusive phenomena related to the trauma induction, relative to a control condition. Suppression was however found to result in a more variable heart rate response during viewing and subsequent impaired free recall memory. Based on these findings, it would seem that emotional suppression during trauma encoding does not lead to the emergence of PTSD-like symptoms.

In an extension to this study involving the same traumatic video footage, Billotti (2006) compared the consequences of experimentally induced emotional suppression with those of emotional acceptance. This latter study identified that suppression reduced self-reported fear during video viewing and led the participant to experience less video-related intrusions in the subsequent week. It also resulted in less accurate free-recall memory for the material. However it did not alter physiological response during viewing, nor did it impact upon subsequent mood. In contrast, acceptance was associated greater negative mood, anxiety and sadness in the week following viewing, in addition to an ongoing elevation of emotional reactivity measured through increased skin conductance response variability after the film and greater heart rate and skin conductance deceleration in response to viewing subsequent emotional pictures.

The Billotti study (2006) suggests that emotional suppression may actually be an adaptive means of encoding during trauma induction, since it is not associated with a clear emotion rebound effect. Furthermore, any impairment in free-recall and reduction

in later intrusions among suppressors may arguably be advantageous, at least for material which is non-idiographic in nature. In contrast acceptance was found to be associated with a more lasting impact of the video material and increased negative emotionality. Interestingly, one advantage of this form of encoding was that acceptors reported less distress in response to video-related intrusions. It is hence possible that they 'feel more' but find their emotions less upsetting; an interesting hypothesis which is worthy of further investigation.

8.2.1 A critique of the experimental research.

The studies conducted by Dunn (2004) and Billotti (2006) provide valuable insight into the effect of suppression and acceptance in relation to the subjective, physiological and behavioural aspects of the emotional response to trauma. However further empirical research is required. In particular, both studies experimentally manipulated emotion processing strategies, a process which could have associated measurement difficulties since participants may fail to follow the induction procedures or may fall back on their habitual ways of dealing with emotion in response to the experimental task.

Furthermore, experimentally induced suppression or acceptance is by its very nature short-term, yet Kashdan et al. (2006) argue that short-term adjustments in EA are a relatively benign way of managing emotional expression and that EA only becomes problematic when it is rigidly applied and inhibits movement towards valued goals. A logical next step might therefore be to compare individuals' responses to a trauma induction according to their positioning on a continuum of trait, rather than state, EA.

8.3 Summary of the experiential avoidance and PTSD research.

Studies of EA within the context of PTSD have largely focussed on historical exposure to trauma and have identified that individuals with such a history are more likely to use EA as a means of coping (Batten et al., 2001) and that this strategy is correlated with the severity of PTSD-type symptoms (Tull et al., 2004). These studies may however be limited by their use of self-report measures to record sometimes distant historical events and by their correlational designs.

Later laboratory research has employed a wider spectrum of measurement techniques and has examined the effect of experimentally-induced EA strategies within a trauma analogue design (Billotti, 2006; Dunn, 2004). Here the link between high EA and PTSD has been found to be less clear cut and it has been suggested that emotional suppression may even have advantages over acceptance in the trauma context.

Different aspects of the construct of EA are investigated in each of these studies. For example, most of the questionnaire research reports on automatic, trait EA at the time of trauma retrieval (often a number of years after the traumatic event). The laboratory studies, on the other hand, consider effortful, state EA at the point of trauma encoding (while watching the video footage) and at retrieval stages (immediately afterward and at one week follow-up). The findings of these studies could perhaps usefully be incorporated into existing models of PTSD in order to develop a broader understanding of the disorder in terms of emotion processing factors.

9. Suggestions for future research.

When exposed to trauma, people may adopt different emotion regulation styles (such as suppression and acceptance) which may have different short or long term

consequences. The current review has begun to highlight important distinctions in these styles, such as the difference between effortful and automatic emotion processing, between trait and state emotion regulation, and between emotion processing both peri and post traumatically.

It is a widely held belief that emotional acceptance is beneficial to psychological well-being and important in recovery from PTSD. Research into the negative impact of high EA (e.g. Gross, 1998; Sloan, 2004) and the positive correlation between EA and PTSD (e.g. Cloitre et al., 2005) would indeed suggest that this is the case. However, current models of PTSD say relatively little about the role of emotion processing in the disorder and the need for further research is therefore evident.

Naturalistic studies which draw on the findings of individuals exposed to actual traumatic events would provide valuable insight into this research field. They do however raise ethical concerns. For example, Draucker (1999) suggested that research with trauma survivors may cause undue distress, while Ruzek and Zatzick (2000) noted that some individuals report unanticipated upset when taking part in research related to a prior trauma, and may have difficulty coping with the associated intense emotional experiences (Templeton, 1993). Furthermore, within a clinical context, the power differential between client and therapist may make it difficult for the former to refuse participation in a proposed research study.

Laboratory research involving healthy participants would therefore minimise the risk of harm while maintaining clear benefit for the understanding of this relatively new research field. It would further provide a useful foundation for subsequent more ethically demanding but more ecologically viable naturalistic studies. In this regard, important future steps could include an examination of the consequences of habitual emotional

suppression compared to those of habitual emotional acceptance when applied to the processing of traumatic events. A design similar to that of Dunn (2004) and Billotti (2006) involving a trauma analogue and comparing individuals along the continuum of habitual EA, incorporating multiple methods of evaluation, such as psychophysiological and self-report, reduces some of the concerns associated with experimentally manipulating state emotion regulation and allows an examination of protective factors in trauma to take place. It therefore has the potential to offer empirical validation for the emotion regulation approaches inherent in acceptance based therapies.

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Part 2: Empirical Paper.

The Impact of Experiential Avoidance in Trauma Encoding.

Abstract.

Experiential Avoidance (EA), or the evasion of unpleasant internal experiences, has been implicated in psychopathology (Hayes, Wilson, Gifford, Follette & Strosahl, 1996) and may be particularly relevant to Posttraumatic Stress Disorder (PTSD). The present study examines how global, long-term EA might relate to particular aspects of the PTSD presentation, using an analogue trauma induction in healthy volunteers (n=45).

Overall, higher trait EA did not negatively impact on responding during trauma, nor did it have mnemonic consequences or influence the experience of intrusions. EA was however associated with hyperarousal immediately after trauma and when viewing subsequent emotional images, along with subjective emotional numbing to these same pictures. There further appeared to be a general affective rebound among higher experiential avoiders, resulting in an increase in their negative affect after trauma exposure.

The current study provides some support for the theory that acceptance rather than avoidance of experience may be of benefit in the context of PTSD; although results were not as clear-cut as Hayes et al. (1996) would predict.

1. Introduction.

Many individuals will be exposed to a traumatic event at some point in their lifetime and up to 25% will go on to develop PTSD (Hidaglo & Davidson, 2000). As such they will experience symptoms including trauma-related intrusions, emotional numbing, avoidance and hyperarousal; from which they may struggle to recover even after a number of years (Kessler, Sonnega, Bromet, Hughes & Nelson, 1995).

The identification of factors associated with the development and maintenance of PTSD is therefore paramount, both to protect vulnerable individuals from the condition and to improve the efficacy of treatments once it is established. Existing research has highlighted a range of variables associated with the disorder (see Brewin, Andrews & Valentine, 2000) and one factor, Experiential Avoidance (EA), has received an increasing amount of research interest. EA has been broadly defined as an unwillingness to remain in contact with aversive private experiences (e.g. physical sensations, thoughts, emotions and memories) and attempts to escape, avoid or modify them (Hayes et al., 1996). The characteristic encompasses some of the avoidance symptoms of PTSD, yet refers to a broader tendency to avoid any unwanted aspect of internal experience be it trauma-related or not (Tull, Gratz, Salters and Roemer, 2004).

Evidence for the link between subcomponents of EA and trauma is gradually expanding. For example, the strategic withholding of emotions (Roemner et al., 2001) and the suppression of negative material (Valentiner, Foa, Riggs & Gershuny, 1996) have both been associated with PTSD symptoms, and research has further identified that EA is a vulnerability factor, rather than a concomitant, in anxiety-related pathology (Kashdan, Barrios, Forsyth & Steger, 2006).

Studies of EA in individuals with a trauma history are also becoming increasingly common. These have identified that the use of EA as a coping mechanism following trauma results in greater impairment in psychological functioning (Plumb, Orsillo and Luterek, 2004) and is positively correlated with PTSD symptom severity among trauma survivors (Tull et al., 2004).

The mechanism through which EA confers vulnerability to PTSD and which aspects of the condition EA drives do however remain unknown. Research in this area is therefore timely, since it may assist in the identification of those predisposed to difficulty and may further lead to the development of alternative and potentially more adaptive ways of responding to and managing traumatic events.

1.1 EA and the symptoms of PTSD.

PTSD is characterised by a range of symptoms including cognitive avoidance, emotional numbing and hyperarousal (APA, 1994). Sufferers further present with a complex pattern of recall related to the traumatic event, involving highly distressing intrusions alongside difficulties in retrieving specific information about the incident. This section shall consider how EA might contribute to such a symptom pattern.

1.1.1 EA in relation to cognitive and affective rebound.

Thought suppression is a sub-component of EA which demonstrates the sometimes paradoxical effects of attempting to push experiences out of mind. Within this paradigm, the more a thought is avoided, the more probable and more intense its recurrence (Wegner, Schneider, Carter & White, 1987). This so-called 'rebound' effect has been demonstrated in a broad spectrum of psychological difficulties and, in the

context of PTSD, has been found to predict the severity of symptoms (Ehlers & Steil, 1995) and the long-term development of the disorder (Mayou & Bryant, 1998; Mayou, Ehlers & Bryant, 2002).

It is possible that EA may maintain trauma via a similar mechanism. In this regard, the avoidance of thoughts and feelings may initially result in the reduction of distress (thereby being negatively reinforced), but may ultimately have the paradoxical effect of increased symptoms and emotional dysregulation in the form of an 'affective rebound' (Hayes et al., 1996). Furthermore, steps taken to avoid such unwanted internal experiences may move the individual away from attaining their valued life goals (Blackledge & Hayes, 2001).

1.1.2 EA and impairment of the trauma memory trace.

A further mechanism through which EA might lead to the development of trauma is by impairing the memory trace for a traumatic event. The normative emotion regulation literature, and in particular the emotion process model (Gross,1998), provides some understanding of the potential impact of EA on trauma memories. In brief, this model predicts that the down-regulation of visible affect consumes finite attentional resources and therefore impacts negatively on memory for any simultaneously presented material (Richards and Gross, 2000). Notably, the detrimental mnemonic effect of such external suppression is particular to the recall of verbally encoded material and is therefore seen to place demands on the language centres needed for this encoding. By extension EA, which involves internal as well as external emotion suppression, may also place demands on verbal encoding centres and, during trauma exposure, may thereby result in reduced memory for the trauma content.

1.1.3 EA and trauma-related intrusions.

It is further possible to speculate about the role of EA in trauma-related intrusions. According to Dual Representational Theory (DRT; Brewin, Dalgleish & Joseph, 1996), the disturbances in memory identified in PTSD are associated with the sufferer encoding traumatic material via their less conscious, situationally accessible memory (SAM) rather than their more conscious, verbally accessible memory (VAM) system. Encoding via the latter leads to a more enriched and comprehensible memory for the trauma, while the former is associated with fragmented sensory responses and increased intrusions. Such processing during trauma leaves the sufferer with a weakened VAM trace and a strengthened SAM trace. The SAM is subsequently activated by reminders of the trauma, resulting in flashbacks and re-experiencing that the weak VAM trace cannot curtail, and as a result PTSD is maintained.

EA may indeed be associated with the type of encoding adopted, since forcing unwanted material out of conscious awareness arguably results in impaired verbal but enhanced situational memory. In addition, high Experiential Avoiders appear predisposed to use VAM resources when exposed to distressing material, showing greater brain activity in the left hemisphere compared to those lower on this characteristic (Cochrane et al., 2004 cited in Barnes-Holmes et al., 2004). Such activity may indicate engagement in verbally-based suppression activities (e.g. telling yourself to think nice things) (Kolb & Whishaw, 2001), and may thereby result in development of a less clear memory trace for the trauma and a greater number of intrusions.

1.1.4 EA and emotional numbing.

Trauma survivors frequently report experiencing emotional numbing in response to situations which would have previously elicited arousal (APA, 1994). Behavioural theories suggest that such numbing stems from the chronic avoidance of trauma-associated information (Keane, Zimering & Cadell, 1985). However, studies have shown that behavioural avoidance actually explains only a small proportion of the variance in numbing symptoms (Litz et al., 1997). The alternative argument is that numbing may be form of 'conditioned analgesia,' which is a consequence of repeated, uncontrollable exposure to trauma reminders (Foa, Zinberg & Rothbaum, 1992); and research has additionally identified a specific association with chronic intentional EA (Roemner, Litz, Orsillo & Wagner, 2001, Tull & Roemner, 2003).

1.1.5 Summary.

EA can be associated with thought and emotional expression suppression; it may therefore contribute to the development and maintenance of PTSD in terms of cognitive and affective rebound, emotional numbing and impairment of the trauma memory trace. Further, where individuals high on EA draw heavily on their VAM system during trauma encoding, then problems with clarity of recall and a subsequent increase in trauma-related intrusions may well follow.

There is limited research which considers each of these PTSD symptoms in relation to the EA characteristic. One means of achieving this would be to examine response to trauma as it is occurring. For ethical and practical reasons this is difficult to accomplish naturalistically, however useful insight may be drawn from research based on experimental design.

1.2 Experimental manipulation of EA.

Experimental manipulation of EA involves the assignment of participants to groups which receive specific emotion regulation instructions. This is a means of testing state EA, or the avoidance of experience in a specific instance, and can be contrasted with trait EA, which is a global tendency to avoid experience. However, the two may well interact such that those with high trait EA may show a greater propensity to elevated state EA under aversive conditions.

Billotti (2006) used an experimental paradigm to explore the psychophysiological and subjective responses to a traumatic video and subsequent emotional images among participants instructed to adopt a state of either high (following suppression instructions) or low (following acceptance instructions) EA.

Interestingly, an affective rebound to parallel that of the thought rebound literature was not identified. However, high state EA did have a detrimental impact on recall for the trauma. Based on the research findings, Billotti (2006) argued that trauma recall requires access to the explicit verbal memory store and, in line with the predictions of the DRT (Brewin et al.,1996; see section 1.1.3), there are limitations in the recall of information from this store among state suppressors. Contrary to DRT however, Billotti (2006) further revealed that there was a reduction, rather than an increase, in intrusions among suppressors; and that acceptors experienced greater subsequent physiological responding and a more lasting negative mood.

Billotti (2006) modelled the understanding of EA in relation to PTSD on an experimental manipulation and may therefore have identified distinct findings from those that would be uncovered through examination of trait tendencies to experientially avoid. Arguably, the latter are more meaningful since an individual's ability to follow

state-based instructions may be influenced by their default approach to emotion regulation.

1.2.1 EA in clinical participants.

The experimental manipulation of EA has also been extended to work with clinical participants (Campbell-Sills, Barlow, Brown and Hoffman, 2006). Here individuals with mood disorders were given a rationale to either accept or suppress emotion while viewing a distressing film. The study revealed that the negative affect of those in the acceptance condition diminished after a two-minute post-viewing recovery period while the same was not true of those instructed to suppress. In terms of physiological measures however, the heart rate of suppressors rose during the film and decreased afterward, while the converse was true for acceptors. Campbell-Sills et al. (2006) thus concluded that suppression was ineffective at reducing subjective experience of negative emotion and was associated with poorer recovery from changes in negative affect compared to acceptance.

Undoubtedly, this study has added to the developing understanding of EA, however it has some limitations. For example, the restriction of emotion rebound measurement to a two-minute recovery period may well mask changes at later time points which could be more meaningful to the individual in a non-laboratory setting. Furthermore, the paper limited its examination of the impact of suppression to subsequent affect and psychophysiology, excluding consideration of any potential effect on processing later emotive material or memory for the presented film. Finally, like the Billotti (2006) paper, the study restricted its focus to state rather than trait EA, which may again reduce the applicability of its findings.

1.2.2 The impact of trait EA on emotional response.

Examination of the effect of trait EA during exposure to distressing material may provide valuable insight into the peri-traumatic processing strategies which pre-dispose individuals to psychological difficulty. Few experimental studies have explored this area and results so far have been mixed.

A key paper is that of Sloan (2004) which identified that high avoiders report stronger affect when exposed to arousing images accompanied by attenuation in physiological arousal, in the form of reduced mean heart rate (HR). Sloan attributed the latter to attempts to regulate emotional experience. However, HR is a complex variable which tends to follow a triphasic response pattern in relation to stimulus exposure, initially decreasing then increasing and finally decreasing again. Mean activity in this variable is therefore difficult to directly relate to participants' response.

1.2.3 Summary.

Billotti (2006) and Campbell-Sills et al. (2006) successfully highlighted the failure of emotion suppression to alleviate distress at a physiological and a subjective level in individuals with and without psychological problems. However, their research design focussed on instructing participants to suppress or accept affect. This state manipulation is distinct from a trait conceptualisation of EA and hence extrapolation of these findings to trait levels of the characteristic may be inappropriate. The work by Sloan (2004) directly compared low and high trait (rather than state) EA both in terms of psychophysiological and self-report measures. However, the paper was not directly trauma-related and it is therefore necessary for more experimental work to examine how trait EA operates within the context of trauma presentation.

1.3 Current Research Aims.

The current study aims to extend the findings of Billotti (2006) regarding the immediate and longer term consequences of emotion suppression in trauma, this time examining trait EA rather than experimentally-induced EA. Like the Billotti (2006) paper, the research will be based on participants' responses to a well-validated analogue trauma induction (cf. Holmes, Brewin & Hennessey 2004) and will examine how EA impacts upon the different symptom clusters of PTSD.

This project has a number of advantages over a state manipulation of EA since participants instructed to regulate their emotion in a particular way may experience difficulty following this procedure when under stress, and may fall back on trait ways of managing emotion. Furthermore, as Kashdan, Barrios, Forsyth and Steger (2006) highlight, short-term shifts in EA such as those associated with state suppression, are a relatively benign means of regulation and it is only where EA becomes a rigid characteristic that it is associated with psychological difficulty.

1.4 Rationale and Hypotheses.

Consistent with Hayes et al., (1996) it is anticipated that EA will be an effective means of emotion regulation in the short-term resulting in a reduction in self-reported emotional experience and psychophysiological arousal during exposure to traumatic material. Such avoidance will therefore be reinforced, however its continued application will have negative consequences, resulting in a more PTSD-like presentation. This will be manifest in greater negative self-reported emotion and psychophysiological arousal soon after the trauma and continued negative emotional experience thereafter (consistent with the thought rebound paradigm, Wegner et al., 1987). It will further be linked with

increased intrusions (consistent with DRT; Brewin et al., 1996) but poor explicit recall of the detail of the traumatic incident (consistent with the emotion process model, Gross, 1998) and blunted affective response to subsequent emotional events (as identified by Roemner et al, 2001).

Integrating the above literature the following hypotheses can be made:

1. *Increasing levels of EA will be associated with a less marked negative self-report and psychophysiological emotional response when viewing the trauma induction.*

2. *Increasing levels of EA will be associated with a more marked negative self-report and psychophysiological emotional response during a post-viewing recovery period.*

3. *Increasing levels of EA will be associated with a greater increase in negative affect and decrease in positive affect in the week following the trauma induction.*

4. *Increasing levels of EA will be associated with higher levels of self-report and psychophysiological emotional response when viewing subsequent negative affective material and lower levels of self-report and psychophysiological emotional response when viewing subsequent positive affective material.*

5. *Increasing levels of EA will be associated with a higher number of intrusions about the trauma film.*

6. Increasing levels of EA will be associated with greater impairment in episodic memory for the trauma film.

2. Method.

2.1 Design.

All participants undertook all aspects of the experiment and the study followed a correlational design with EA as the semi-independent variable. The dependent variables were physiological measures and self-report ratings of emotional experience on viewing the trauma and subsequent emotional images, mood in the week prior and week after the trauma induction, the number of trauma-related intrusions over a seven day period and memory for the trauma video.

Table 1 provides a summary of the manipulation tests used in addition to the measured constructs and their relationship with the study design. Each of the measures described is outlined in further detail in the measures section (2.3).

Table 1. Summary of measured constructs.

Manipulation Test.	**Measure**	**Aspect measured.**
Trauma induction	Video of aftermath of 5 real-life road traffic accidents.	Response to trauma analogue.
Subsequent emotional material.	International Affective Picture Scale- happy, sad, disgusting and fearful images.	Response to emotional images after video viewing.

Construct.	Measure applied.	Variable type.	Time of measurement.
Experiential Avoidance	Acceptance and Action Questionnaire.	Semi-independent	Prior to experiment.
Impact of trauma induction on discrete self-reported emotion.	Visual analogue scales of happiness, sadness, fear, disgust and distress.	Dependent	Pre, during and post-video viewing and after each International Affective Picture Scale image.
Physiological response to video viewing	Galvanic Skin Response	Dependent	Measurement 2 minutes pre, during and 2 minutes post video viewing and throughout International Affective Picture Scale.
Mood associated video viewing.	Beck Depression Inventory (BDI)	Dependent	Measurement for week prior and week post video viewing taken at start of sessions 1 and 2.
	State Trait Anxiety Inventory (STAI) –trait subsection.	Dependent	Measurement for week prior and week post video viewing taken at start of sessions 1 and 2.
	Positive Affect Negative Affect scale	Dependent	Measurement for week prior and week post video viewing taken at start of sessions 1 and 2.

Construct.	Measure applied.	Variable type.	Time of measurement.
Trauma-related intrusions.	Diary of intrusions	Dependent	Completed throughout the week after video viewing.
Memory for trauma induction.	Recognition and recall memory questionnaires	Dependent	Completed one week after video viewing.

2.2 Participants.

2.2.1 Sample Size

A medium effect size, d=.50 (Cohen, 1992), was assumed as the concept of EA was considered to be of clinical utility only if it were of some magnitude. 80% power to detect such an effect based on regression analyses with two predictor variables and a .05 significance level requires a total of 67 participants. This size is comparable to existing research which found significant effects (e.g. 60 participants in Campbell-Sills et al., 2006).

2.2.2 Recruitment.

The research took place at the Medical Research Council, Cognition and Brain Sciences Unit (CBU), Cambridge. Initially, healthy adult research volunteers attending the unit to take part in other experiments were invited to participate if their responses fell within the upper or lower quartiles on the Acceptance and Action Questionnaire (A measure of EA by Hayes et al. 2004; see section 2.2.1). The aim here was to ensure a

reasonable distribution spread of EA. Fourteen participants were recruited in this fashion.

It later became necessary to draw from the general CBU volunteer pool. 152 panel members were contacted by telephone. Of these, 63 did not respond to messages, 28 could not take part for practical reasons and 16 refused because of the nature of the experiment. The remaining 45 agreed to participation, of which 38 finally attended the testing session.

The research was approved by the University of Cambridge Psychology Research Ethics Committee and all participants gave written informed consent. They were each paid five pounds an hour for their involvement and were given a contribution towards their travel expenses.

A copy of the ethical approval, information sheet and consent form can be found in Appendix A.

2.2.3 Screening.

Due to the nature of the experiment, it was necessary to identify individuals who may be particularly vulnerable to distress at viewing traumatic material. A screening for previous traumatic response to difficult life-events therefore took place using the Posttraumatic Stress Diagnostic Scale (Foa, 1995). Those with a history of PTSD would have been excluded; however none were found.

Participants were also screened for pre-existing mental health problems. This led to the exclusion of one volunteer who had a history of major depression. In addition, participants completed the Beck Depression Inventory (BDI; Beck et al., 1961) and the Spielberger State-Trait Anxiety Inventory (STAI; Speilberger et al., 1983) as an

assessment of current symptomatology in relation to depression and anxiety. Those scoring above the clinical cut off of 10 on the BDI (symptomatic range according to Shaw, Vallis & McCabe, 1985) and more than two standard deviations from the mean on the STAI (following Dunn, 2004) would have been excluded from the study, however no participants were within this range.

For practical reasons, participants were also screened for colour blindness (none identified) and instructed to wear their glasses or contact lenses as necessary.

2.2.4 Final Sample.

52 volunteers originally attended the laboratory. From this sample, one participant was excluded due to their mental health presentation (see screening above) and data from a further four were not used because of equipment failure. In addition, two participants withdrew during the trauma film as they found the footage too distressing. Both improved soon after and did not note any adverse consequences at one week follow-up.

The final sample size was therefore 45, of whom 32 were female. All were aged between 18 and 65, with an average age of 38 (SD=17.04; range=18-64).

With the exception of three volunteers who had a marked foreign accent, all participants completed the NART which provided an approximate measure of their general intelligence. The full-scale average IQ of the sample was estimated as 117 (SD=6.83; range=101-126).

2.3 Measures.

Copies of all non-copyrighted measures described in this section can be found in appendix B.

2.3.1 Trait questionnaire.

The degree of EA endorsed by participants was established through the Acceptance and Action Questionnaire, AAQ (Hayes et al., 2004). This is a 9-item self-report measure based on a Likert scale (1 = never true, 7 = always true). It measures key aspects of EA including unwillingness to experience emotions, physiological sensations and thoughts, in addition to attempts to alter their form and frequency. The AAQ has satisfactory internal consistency (0.70) and correlates with specific and general measures of psychopathology (Hayes et al., 2004).

2.3.2 Trauma Induction video.

To produce an analogue of trauma within an experimental setting, participants viewed a 12.5 minute video featuring the aftermath of real-life road traffic accidents (devised by Steil, 1996). The video comprised scenes in which passengers either died or were seriously injured; each was introduced by a narrator who provided a context to the accident and to those involved. The presentation involved an initial and final two-minute rest period and five separate accident scenes. The first rest served as a baseline and the last as a means of examining short-term recovery after video viewing (following Campbell-Sills et al., 2006).

Participants were asked to rate (on a 0-100 visual analogue scale) their experience of happiness, sadness, fear, disgust and distress immediately following each

video scene and after the pre and post-video rest periods. This allowed measurement of change in discrete emotional states that previous studies have suggested are induced by viewing the video (e.g. Dunn, 2004; Billotti, 2006).

The suitability of the selected video is evidenced in its use by previous experimenters (Brewin & Saunders, 2001; Dunn, 2004; Holmes et al. 2004; Billotti, 2006) who found it served as a reasonable trauma induction without causing undue distress.

2.3.3 International Affective Picture Scale (Lang et al. 2003).

As a measure of emotion processing subsequent to trauma induction, participants viewed 27 images selected from the International Affective Picture Scale (IAPS). This scale has detailed norms and physiological response data (Bradley & Lang, 2000). The images were either neutral (e.g. a plug socket) or representative of the 4 main emotions: fear (e.g. an attacking snake), disgust (e.g. vomit), sadness (e.g. a starving child) and happiness (e.g. an embracing couple).

For comparison purposes, the pictures shown were identical to those viewed by participants in the Billotti (2006) study, where they reliably induced the desired discrete emotions. Each of the images were presented in a pseudo-random order and, after viewing an image for a total of six seconds, participants were asked to rate the degree of sadness, happiness, disgust and fear they experienced (on a 0-100 visual analogue scale). Following Bradley et al. (2001), there was an eight second inter-trial interval between presentations.

2.3.4 Mood questionnaires.

The impact of the trauma-induction video on participants' self-reported mood was assessed through questionnaires for the week prior to the experiment and the week following. Where necessary, instructions were modified so as to specifically measure mood over the previous week:

The Positive Affect Negative Affect Scale (PANAS; Watson, Clark & Tellegen, 1988) consists of 16 adjectives that describe affective experience. Respondents rate each one on a 0-4 scale (0=very slightly or not at all, 4=extremely). The PANAS is widely used and has good reliability and validity (Mackinnon et al., 1999).

The Beck Depression Inventory (Beck et al., 1961) is a 21-item questionnaire which measures characteristic symptoms of depression and has 4 possible responses (0=absence of symptom, 3=symptom present at severe levels). The BDI is widely used and has high reliability and stability (Beck et al., 1979).

The trait subsection of the State Trait Anxiety Inventory, (Spielberger, 1983) is a 20 item measure of stable propensity to experience anxiety with four response options (1=almost always, 4=almost never). The STAI is widely employed and has good reliability and validity (Bieling, Antony & Swainson, 1998).

2.3.5 Diary of Intrusions (cf. Holmes et al., 2004)

Participants completed a week-long diary of any spontaneously occurring, non-deliberate thoughts or images related to the video. This required them to note when an intrusion occurred, provide a brief description and rate the amount of distress associated with it (on a 0-100 scale). If the participant did not experience any intrusions, they were asked to insert a '0'.

Following Davies and Clark (1998), at one-week follow-up, participants rated their diary compliance on a 10-point scale. The diaries of those scoring 9 or greater (indicating very low compliance) would have been excluded; however this did not prove necessary.

2.3.6 Memory Assessment Questionnaires.

One week after viewing the trauma video, participants completed a recognition memory questionnaire (Hennessy, 2002). This measure contained 20 descriptions of traumatic scenes all of which could plausibly have occurred in the video but only half of which actually did, participants were asked to decide whether or not they took place. A 15-item cued recall questionnaire (Holmes et al., 2004) examining specific details from the video was also administered. Both of these were designed by previous experimenters (Holmes and Hennessy) specifically for application to the video used in this study.

2.4 Procedure.

Participants attended the CBU on two occasions separated by one week. Session one lasted approximately 120 minutes and session two lasted 30 minutes. In the interim period, participants completed the diary of re-experiencing symptoms related to the video footage (taking around 5 minutes a day). An experimental protocol outlining the order of administration can be found in appendix C.

2.4.1 Session one.

Following screening, participants completed the AAQ and measures of mood over the past week. The video footage and the emotional images were then presented in

an adjacent darkened laboratory on a 17" flat-screen computer monitor. Participants viewed the material from a seated position while wearing electrodes on their fingertips for the purpose of physiological measurement (detailed in section 2.4). Immediately before and after video viewing, participants were required to sit quietly for two-minutes, and during the video and the visual image presentation, they were instructed to respond to computerised questions about their emotional state. These were programmed in Microsoft Visual Basic 6.0 (Microsoft, 2000). Participants were informed that the experimenter would remain in an adjacent room and would be able to hear them should they require assistance. At the close of the session, they were given the intrusion diary for completion over the coming week.

2.4.2 Session two.

Participants' diaries were reviewed and they completed questionnaires associated with the impact of the trauma induction on their mood over the past week in addition to recognition and recall memory tests for the traumatic material. They were then debriefed as to the experimental aims. Twenty of the follow-up sessions took place over the telephone and participants returned the appropriate questionnaires by post.

2.5 Psychophysiological recording.

GSR was recorded as an additional measure of emotional response which is less susceptible to demand effects than self-report measures and may therefore broaden the findings of this study[1]. Both mean GSR and mean GSR variability (SD) were examined.

[1] Heart Rate was also recorded; however it will not be reported in this paper as all analyses were non-significant.

It was anticipated that the latter would capture variance in GSR over longer time periods (e.g. an entire video scene) more clearly than simple mean changes, with greater variance indicating more GSR reactivity.

A BIOPAC MP100 unit running Acqknowledge 8.0 software (BIOPAC, 1997) was employed for all GSR recording. This unit had one GSR 100B amplifier set to direct current with a sensitivity of 5umho/V and a 10Hz low-pass filter and 0.05Hz high-pass filter. Throughout the recording the sampling rate was set at 200 samples per second, providing a temporal resolution of 5ms.

GSR was measured in micro-siemens (μS). To achieve this, participants were asked to wash their hands with soap and water. An Ag-AgC1 GSR electrode was then attached to the tips of both the first and second fingers of their non-dominant hand and BIOPAC GSR hypoallergenic paste was used as the electrolyte. The method followed that of Billotti (2006) and was based on published GSR (Dawson, Schell & Fillion, 2000) research guidelines.

Particular events in the experimental task (e.g. the appearance of a new emotional image) were marked on the Acqknowledge record. This was made possible via communication between the digital input ports of the BIOPAC MP100 and the parallel port of the computer that was showing the video and the emotional images. In every case, physiological response was indexed relative to baseline, to control for individual differences in resting state GSR.

2.6 Statistical Analysis.

The key hypotheses were examined through regression analyses. For every regression, the AAQ and a baseline measurement of the variable of interest were entered

as independent variables and the outcome variable was entered as a dependent. It was therefore possible to examine the impact of EA having controlled for baseline differences[2].

The AAQ results were normally distributed, there was however one outlier who reported a legitimate but high level of EA. It was decided to keep this outlier in the analyses rather than narrow the AAQ range. Supplementary regressions were however run with the outlier's score reduced to 1 unit above the next highest scorer (following Tabachnick and Fidell, 1996). Where this produced a different result, it will be highlighted.

Prior to analysis the variables were screened for accuracy of data entry and outliers that were more than three standard deviations from the mean. Each test was further preceded by an initial screening run in which the main assumptions of regression were examined (following Tabachnick and Fidell, 1996). In particular, scatterplots of the residuals were scanned for normality and multivariate outliers were identified based on a criterion of $D_i \geq 1$ for Cook's Distance. Where necessary, variables were transformed and the influence of outliers was reduced. A list of any necessary transformations can be found in appendix D.

Prior to exploring the hypotheses, a number of checks were carried out to ensure the experimental manipulations had worked as intended (e.g. that viewing the trauma video induced negative affect). This was achieved through repeated measures Analyses

[2] Prior to each regression, a correlation was run to establish whether any demographic variables (i.e. age, gender, intelligence) were significantly associated with the dependent variable. If this were the case, an additional hierarchical regression was carried out with significantly related demographic variables entered into the first block and AAQ entered into the second. This followed the recommendations of Cohen and Cohen (1983) and was based on the rationale that demographic variables precede EA in terms of causal priority. None of the hierarchical regressions produced a different pattern of results; for reasons of clarity they will therefore not be reported.

of Variance (ANOVA) or paired samples t-tests. For some of the AVOVA, variables did not become normal after transformation. This should not influence the results as the F-test is robust to violations of normality in univariate ANOVA where there are ≥20 degrees of freedom (Tabachnick and Fidell, 1996). For every ANOVA the within-participants result is reported unless the assumption of sphericity was violated, in which case the multivariate output is given.

Tests were two-tailed throughout, and an alpha value of .05 was taken to indicate significance and .10 to suggest a trend.

3. Results.

3.1 Measurement of Experiential Avoidance.

Mean score on the 9 item AAQ across participants was 26.91 (SD = 7.69; range 9-37, with one outlier of 52). This is lower than published non-clinical norms for the scale (mean=32.9, SD=6.9; Hayes et al., 2004).

3.2 Response to trauma induction.

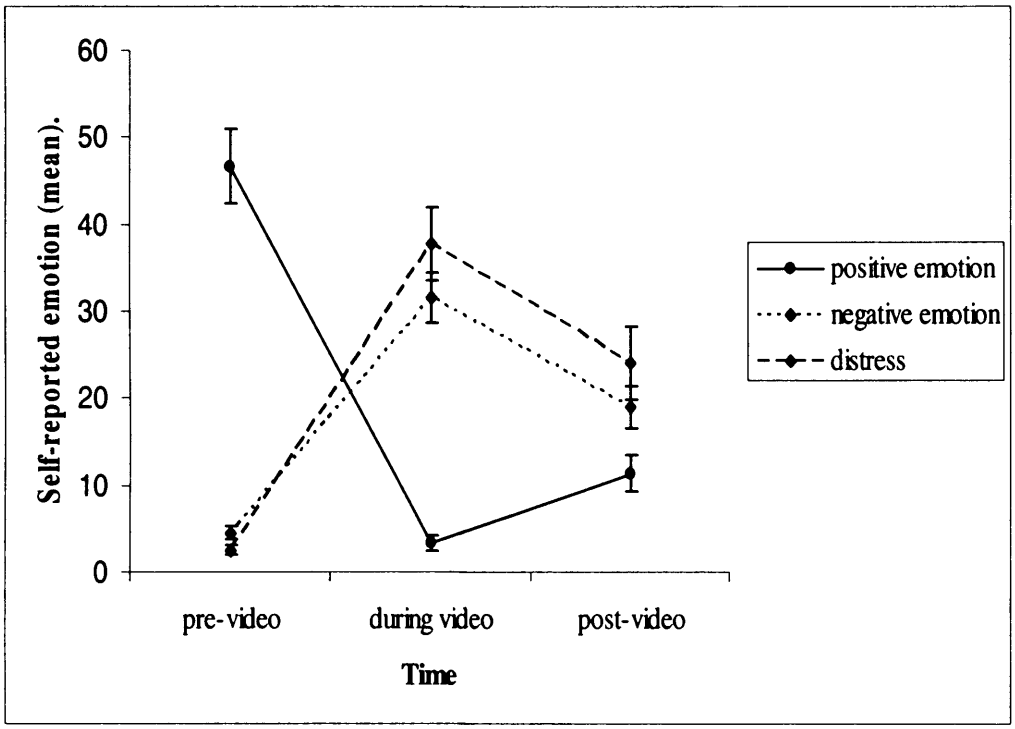
3.2.1 Self-report response to the videos.

To examine whether the video was an effective emotion induction, participants' self-reported experience of positive affect (happiness) and negative affect (average of sadness, fear and disgust) were contrasted pre, during and post video viewing[3].

[3] These variables were collapsed as they are highly intercorrelated, the lowest reported correlation being r=.52, p<.01.

Participants' general distress ratings were also examined, as EA has been specifically associated with such phenomena in adults presenting with a trauma history (e.g. Plumb et al., 2004). Figure 1 displays the scores for each of the emotion variables at the different time points.

Figure 1. Self-reported emotional experience before, during and after video viewing.



Note: Data are mean and standard error or mean values and are based on a 0-100 visual analogue scale.

Three repeated measures ANOVA were run with time (pre, during and post-viewing) as the within subjects factor. There was a significant difference across the three time points for positive emotion, $F(2,86)=101.62$, $p<.01$; negative emotion , Wilks' Lambda=.16, $F(2,42)=110.36$, $p<.01$, and distress ratings, $F(2,88)=121.93$, $p<.01$. For distress and negative affect, participants reported an increase from rest to video viewing, which reduced during the recovery period but did not return to baseline levels

(Bonferroni corrected post hoc tests, $p<.01$ for all comparisons). Participants further reported less positive emotion during viewing compared to pre-viewing, their scores then increased in the recovery period but remained lower than pre-viewing levels ($p<.01$ for all Bonferroni-corrected comparisons).

Overall, it would seem that the video is an effective negative mood induction which continues to have an impact during the two-minute recovery period.

3.2.2 EA and self-reported emotion during and after video viewing.

In order to establish whether a participant's level of EA is associated with changes in their self-reported emotional state, two separate sets of regression analyses were run. The first examined the association between EA and emotion during viewing, using baseline emotion pre-viewing and AAQ as independent variables. The second examined post-viewing emotion levels, this time with emotion during viewing (as a baseline) and AAQ as the independent variables.

The overall regression equation for positive emotion during viewing was non-significant, $F(2,42)=1.90$, $p=.16$, $R^2=.08$, adjusted $R^2=.04$; as was that for self-reported negative emotion during viewing, $F(2,42)=.20$, $p=.82$, $R^2=.01$, adjusted $R^2=-.04$; and for self-reported distress, $F(2,42)=.57$, $p=.57$, $R^2=.03$, adjusted $R^2=-.02$.

Inconsistent with hypothesis one, there appears to be no clear relationship between EA and subjective emotional-response whilst viewing the trauma induction.

Consideration of self-reported emotion during the recovery period revealed that the regression equation for positive emotion was significant, $F(2,41)=9.34$, $p<.01$, $R^2=.31$, adjusted $R^2=.28$. Positive emotion during viewing independently accounted for a significant amount of the variance in positive emotion during recovery, $\beta=.56$, $t=4.3$,

$p<.01$, while AAQ did not, $\beta=-.07$, $t=-.56$, $p=.58$. The overall regression of self-reported negative emotion in recovery was also significant, $F(2,42)=29.14$, $p<.01$, $R^2=.58$, adjusted $R^2=.56$. Negative emotion during viewing accounted for a significant amount of the variance in negative emotion during recovery, $\beta=.74$, $t=7.44$, $p<.01$, and there was a trend towards AAQ also independently doing so, $\beta=.17$, $t=1.70$, $p=.09$. Finally, the overall regression equation for self-reported distress during the recovery period was significant, $F(2,42)=21.73$, $p<.01$, $R^2=.51$, adjusted $R^2=.49$. All variables explained a significant amount of the variance (distress during viewing: $\beta=.68$, $t=6.30$, $p<.01$; AAQ: $\beta=.22$, $t=2.05$, $p=.05$)[4].

In partial support of hypothesis Two, higher EA is independently associated with higher self-reported negative emotion and distress (but not lower positive emotion) during recovery. This association reaches significance in relation to distress.

3.2.3 Physiological response to the videos.

A one-way repeated measures ANOVA was employed to examine the overall difference between participants' average resting-state GSR pre-viewing, during viewing, and post-viewing. The same procedure was followed for a comparison of mean variability in participants' GSR response. Table 2 outlines the scores for average GSR and GSR variability at the different time points.

[4] With the AAQ outlier adjusted the overall regression remains significant ($F(2,42)=21.73$, $p<.01$) as does the effect of distress during viewing ($\beta=.67$, $t=6.15$, $p<.01$). However the effect of AAQ becomes a trend towards significance ($\beta=.21$, $t=1.93$, $p=.06$).

Table 2. Mean GSR and GSR variability before during and after video viewing.

Measure	2 minute pre-viewing M (SD)	During viewing M (SD)	2 minute post-viewing M (SD)
GSR mean	5.72 (1.87)	5.90 (2.22)	6.16 (2.51)
GSR variability (SD)	.22 (.14)	.26 (.23)	.29 (.30)

A significant difference was identified in participants' GSR mean before, during and after viewing, Wilks' lambda=.83, F(2,40)=3.99, p=.026. Bonferroni corrected post-hoc tests revealed that participants' mean GSR changes (non-significantly, p=.52) from pre-viewing to viewing, and rises (significantly, p=.05) from viewing to recovery.

There is no overall significant difference in the variability of participants GSR response before, during and after viewing, Wilks' lambda=.99, F(2,40)=.03, p=.97. Participants GSR variability increases non-significantly from pre-viewing to during viewing and from during viewing to post viewing (p=1.0 in both cases).

Overall, the trauma induction does not appear to reliably impact on participants' psychophysiological emotional response in terms of mean GSR or GSR variability averaged across participants.

3.2.4 GSR measures during and after viewing.

To establish whether EA is associated with changes in mean GSR or GSR variability, two separate sets of regression analyses were run, these followed the same approach as the self-report data (see section 3.2.2) with baseline GSR levels and AAQ entered as independent variables.

The regression equation for GSR mean during viewing was significant, $F(2,39)=127.11$, $p<.01$ $R^2=.87$, adjusted $R^2=.86$. GSR mean during viewing was highly significantly associated with GSR mean pre-viewing, $\beta=.92$, $t=15.51$, $p<.01$, but was not significantly associated with AAQ, $\beta=.09$, $t=1.41$, $p=.17$. The regression equation examining variability in GSR measures during viewing was also significant, $F(2,39)=24.35$, $p<.01$, $R^2=.56$, adjusted $R^2=.53$. Variability in GSR pre-viewing accounted for a significant amount of the variance, however AAQ did not, $\beta=.72$, $t=6.64$, $p<.01$; $\beta=.13$, $t=1.23$, $p=.23$, respectively.

Contrary to hypothesis one, there is no association between EA and GSR mean or variability during the trauma induction.

For GSR mean during recovery, the overall regression equation was significant, $F(2,39)=390.15$, $p<.01$ $R^2=.95$, adjusted $R^2=.95$. GSR mean during viewing accounted for a highly significant amount of the variance in GSR mean for recovery, $\beta=.97$, $t=27.20$, $p<.01$, while AAQ did not, $\beta=.01$, $t=.32$, $p=.75$. With regard to variability in GSR during recovery, the overall regression equation was also significant, $F(2,39)=59.6$,$p<.01$ $R^2=.75$, adjusted $R^2=.74$. Both variables explained a significant amount of the variance, $\beta=.80$, $t=9.79$, $p<.01$ for GSR variability during viewing, and $\beta=.20$, $t=2.48$, $p=.02$ for AAQ.

In accordance with hypothesis two, high EA is independently associated with more variability in GSR during recovery. However, mean GSR during this period is not significantly linked with levels of EA.

3.3 Mood change following trauma induction.

3.3.1 Overall affect differences from week one to week two.

In order to establish whether viewing the video influenced mood in the week following the experiment, paired samples t-test analyses were employed. These compared all participants' scores on mood measures for the week prior and week after the experiment (see Table 3).

Table 3. Ratings of emotional state in week prior and week post trauma induction.

Variable	**Week prior M (SD)**	**Week post M (SD)**	**Statistical comparison**
PANAS positive affect	35.00 (6.67)	32.82 (7.38)	t(44)=2.42, p=.02
PANAS negative affect	14.22 (3.55)	14.04 (4.35)	t(44)=.74, p=.46
BDI	3.84 (4.03)	4.25 (4.96)	t(44)=.76, p=.45
STAI modified trait anxiety subscale	11.13 (2.56)	10.43 (3.08)	t(43)=2.07, p=.05[a]

[a] One participant failed to complete the STAI in session 2 and is therefore missing from this analysis.

The t-tests revealed that overall participants show a significant decrease in anxiety (as measured by the STAI) and in PANAS positive affect in the week after video viewing compared to the week prior. There were however no differences in PANAS negative affect nor in BDI depression scores between the two weeks.

3.3.2 EA and Affect questionnaires.

Regression analyses were employed in order to establish whether participants' ratings on EA were associated with their affect in week two. For each regression, baseline affect scores from week one and AAQ were entered as the independent variables.

The regression equation for PANAS positive affect in week two was significant, $F(2,42)= 17.50$, $p<.01$, $R^2=.46$, Adjusted $R^2=.43$. Both dependent variables explained a significant amount of the variance, $\beta=.55$, $t=4.55$, $p<.01$; $\beta=-.25$, $t=-2.03$, $p=.05$, for PANAS week one and AAQ respectively[5].

The overall regression equation for PANAS negative affect in week two was also significant, $F(2,42)= 5.36$, $p=.008$, $R^2=.20$, Adjusted $R^2=.16$. However, only PANAS negative affect in week one accounted for a significant amount of the variance in week two scores, $\beta=.35$, $t=2.44$, $p=.02$, while AAQ did not, $\beta=-.20$, $t=-1.38$, $p=.18$.

In addition, the overall regression equation for the BDI was significant, $F(2,41)= 18.03$, $p<.01$, $R^2=.47$, Adjusted $R^2 = .44$. Both dependent variables accounted for a significant amount of the variance in week two BDI scores, $\beta=.50$, $t=3.67$, $p=.01$; $\beta=.27$, $t=1.99$, $p=.05$, for BDI week one and for AAQ respectively[6].

Finally, the overall regression equation for STAI anxiety scores in week two was significant, $F(2,41)= 12.63$, $p<.01$, $R^2=.38$, Adjusted $R^2=.35$. Both variables explained a

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[5] The association between AAQ and PANAS positive affect was no longer significant in a regression with the outlier on AAQ reduced ($F(2,42)=15.68$, $p<.01$, $R^2=.43$, Adjusted $R^2 =.40$, ($\beta=.56$, $t=4.44$, $p<.01$; $\beta=-.17$, $t=-1.40$, $p=.17$, for PANAS week one and AAQ respectively). The result therefore needs to be interpreted with caution.

[6] The BDI data were significantly positively skewed and contained outliers, log transformation reduced the influence of outliers but did not make the data normal. With the AAQ outlier reduced, the association between BDI and EA becomes a trend rather than reaching significance ($F(2,41)=17.06$, $p<.01$, $R^2=.45$, Adjusted $R^2 =.43$, ($\beta=.53$, $t=3.78$, $p<.01$; $\beta=-.23$, $t=-1.68$, $p=.09$, for BDI week one and AAQ respectively). The results should therefore be interpreted with caution.

significant amount of the variance in scores, β=.36, t=2.50, p=.02; β=-.35, t=-2.45, p=.02, for STAI modified trait anxiety week one and for AAQ respectively.

In summary, in accordance with hypothesis three, higher EA is independently associated with significantly lower positive affect on the PANAS and higher BDI depression and STAI anxiety scores in the week after trauma induction. However, contrary to the hypothesis, there is no association between EA and PANAS negative affect for the week following the experiment.

3.4 Response to subsequent affective material.

3.4.1 Self-report response to the IAPS

For examination of self-report responses to the IAPS, fear, disgust and sadness were collapsed into one 'negative' emotion category consistent with earlier hypotheses[7]. For each regression, target emotion ratings for a particular set of images (e.g. happiness to positive images) had the comparable baseline rating for neutral images (e.g. happiness to neutral images), along with the AAQ, entered as independent variables into the equation. This controlled for differences in individuals' general orienting response to new images and in how participants globally used the rating scale.

The overall regression for positive emotional response to positive images was significant, $F(2,42)=4.40$, $p=.02$, $R^2=.17$, Adjusted $R^2=.13$. There was a trend towards positive emotional response to neutral pictures predicting a significant amount of the variance, $\beta=.24$, $t=1.73$, $p=.09$. As predicted, AAQ was significantly negatively

[7] These variables were collapsed as they are highly intercorrelated, the lowest reported correlation being $r=.63$, $p<.01$.

associated with the amount of positive emotion reported to positive images, β=-.36, t=-2.54, p=.02.

With regard to negative emotional response to negative images, the overall regression was significant, F(2,42)=3.25, p=.05, R^2=.13, Adjusted R^2=.09. There was no association between negative emotional response to neutral pictures and negative emotional response to negative pictures, β=.14, t=.92, p=.36. Contrary to the hypothesis, AAQ was significantly negatively (not positively) associated with the amount of negative affect participants reported to negative images, β = -.37, t= -2.52, p=.02.

Overall, higher EA is associated with lower subjective emotional response to both positive and negative images. Contrary to hypothesis four, this does not reflect a pattern of high self-report response to negative images and low self-report response to positive.

3.4.2 Physiological response to IAPS.

GSR to each image was automatically quantified in terms of response during the six-second image presentation minus response during a preceding one second baseline. These difference variables were correlated with EA in order to establish whether there was any association between them. This analysis identified that, in accordance with hypothesis four, there is a highly significant positive correlation between AAQ and GSR to negative images, r=.50, p<.01. Contrary to the hypothesis however, there is also a highly significant positive (not negative) correlation between EA and positive images, r=.47, p<.01.

In summary, higher EA is linked to higher GSR response to all images, regardless of their valence. This is in conflict with hypothesis four which predicted a high response to negative images and a low response to positive.

3.5 Intrusions following trauma induction.

Compliance ratings for the seven-day intrusion diary were good (M=2.77, SD=2.16, on a scale from 0-10 where higher scores indicate lower compliance) and comparable to the previous literature (cf Holmes et al., 2004). The mean number of intrusions experienced by participants over the week was 6.80 (SD=7.68, range 0-33). A simple correlation between the number of reported intrusions and scores on the AAQ was non-significant (r=-.10, p=.50).

For those participants who reported at least one intrusion, a correlation of their average intrusion-related distress levels with the AAQ revealed that there was no significant association between the two variables. The distress variable was not normally distributed and could not be transformed, spearman's rho= -.06, p=.72.

Contrary to hypothesis 5, there is no clear link between levels of EA and the presence of intrusions in the week after trauma induction nor the level of distress reported from those intrusions.

3.6 Memory for the trauma induction.

The mean percentage of correct answers given on the recognition memory test was 68.98% (SD=12.08) and on the recall memory test 52.80% (SD=12.45), comparable to previous published research (cf Holmes et al., 2004). The data were not normally distributed and could not be transformed. Simple non-parametric correlations revealed

that there was no significant association between AAQ and recall or recognition memory for material contained in the trauma film (spearman's rho=.01, p=.94, spearman's rho=.12, p=.44, respectively).

Contrary to hypothesis 6, there is no identified association between EA and episodic memory for the trauma material.

4. Discussion.

The current paper sought to examine whether trait EA might contribute to the development and maintenance of PTSD. Healthy participants viewed an analogue trauma induction and their concurrent and subsequent emotional and mnemonic responses were measured. The extent to which these related to EA was then explored.

Contrary to hypothesis one, EA was not associated with subjective or psychophysiological emotional response during trauma. Consistent with hypothesis two, EA was linked to greater self-reported negative affect, distress and increased variability in GSR immediately post-trauma. Inconsistent with this hypothesis however, there was no clear relationship between EA and subjective positive emotion or mean GSR in the same time period.

In accordance with hypothesis three, an association was identified between EA and higher depression and anxiety scores as well as lower positive affect at one-week follow-up. However this link did not extend to negative affect results. Contrary to the predictions of hypothesis four, higher EA was associated with lower subjective and higher psychophysiological emotional arousal to subsequent images, regardless of their valence. Finally, in contrast to the predictions of hypotheses five and six, there was no significant association between EA and trauma-related memory or intrusions.

4.1 Theoretical Implications.

Hayes et al. (1996) argue that EA is a pervasive aspect of human functioning which is inherently problematic and is directly associated with psychopathology. The current research raises a variety of theoretical implications for the immediate and longer-term effects of EA in trauma, and provides only partial support for the theory that it consistently has negative consequences.

4.1.1 Immediate Consequences of EA in Trauma.

The rebound hypothesis (Wegner et al., 1987) suggests that successful suppression is associated with temporary attenuation in the experience which the individual is attempting to suppress (followed by later increase). A broad conceptualisation of this hypothesis, indicates that increased levels of EA would be associated with less-marked negative self-report and psychophysiological emotional response during trauma encoding. This prediction was not supported. Instead, EA was unsuccessful in reducing the experience of emotion.

The research findings extend those of the normative emotion regulation literature (Gross, 1998) and suggest that internal as well as external emotion suppression fails to impact on self-reported experience. They further contrast with Billotti (2006), who identified that state suppressors describe less self-reported fear during trauma exposure. Billotti's results highlight important differences between state and trait emotion regulation and indicate that instructions to regulate mood through suppression may result in greater attenuation in subjective negative emotion compared to the application of trait EA techniques.

Contrary to the predictions of Sloan (2004), reduced psychophysiological responding during trauma was not noted. However, as Sloan did not record GSR, her result may reflect some of the difficulties in using mean HR as a basis to understand psychophysiological change (see section 1.2.2).

The current findings suggest that trait EA is an ineffective form of emotion regulation which is not associated with any attenuation in emotional experience. Notably, this result can not be explained by the induction failing to activate EA tendencies, since participants reported trying to control their emotions during viewing approximately 25% of the time, and up to 100% in some cases. Given that this form of regulation is ineffective, its continued use by trait avoiders may be linked with the fear of becoming overwhelmed by emotion, and the fact that this does not occur may serve as 'evidence' for the efficacy of their regulation technique. Support for this possibility can be drawn from Watkins & Moulds (2005) who identified a similar pattern among ruminators, whereby positive beliefs about the benefit of rumination were clearly associated with elevated levels of engagement in this regulation strategy.

4.1.2 Longer Term Consequences of EA in Trauma.

4.1.2.1 EA and mood during recovery.

Following the rebound hypothesis (Wegner et al., 1987), it was anticipated that EA would be associated with a marked amplification in subjective negative emotional response and psychophysiological arousal during a post-viewing recovery period. The research revealed partial support for this hypothesis, noting greater variability in GSR and increased negative self-report among high avoiders.

Greater GSR variation is associated with elevated emotional response in the autonomic nervous system, which in turn is linked to increased anxiety reactivity (Shields et al., 1987), while changes in negative emotional responding are indicative of lowered subjective mood. The average overall shifts in GSR variation and in mood ratings were however rather small and may not be clinically significant, although it could be argued that they remain representative of larger responses which would take place in real-life trauma.

The current research findings both support and extend those of Campbell-Sills et al. (2006) who identified clear residual negative affect, but less clarity in physiological response among state suppressors. They also highlight the advantages of this paper over the existing research of Sloan (2004) and Billotti (2006) who both hypothesised that EA would result in an immediate negative rebound but did not measure this.

4.1.2.2 EA and mood at one-week follow-up.

The rebound effect predicts that increasing levels of EA are associated with greater negative affect and less positive affect in the week after trauma induction. In the main this hypothesis was supported, indicating that trait EA may be a harmful form of affect regulation which has a lasting effect on subsequent mood.

The study's results can be contrasted with those of Billotti (2006), who identified a significant pattern in the opposite direction. Based on her findings, Billotti argued that acceptors may experience but not become overly engaged in negative affect, in line with the Acceptance and Commitment Therapy literature (ACT; Hayes, Strosahl & Wilson, 2003). However, the current trait-based findings would suggest that specific instructions

to accept emotion (as would occur in ACT), may have a different impact from applying pre-existing low levels of EA during trauma exposure.

As with the previous finding, caution needs to be applied in interpretation of the results since no association was found with negative affect scores, and the overall group changes between weeks one and two were either very small or in the opposite direction to anticipated (e.g. STAI). Again, these changes are not clinically meaningful and may therefore be of limited ecological validity.

4.1.2.3 EA and subsequent emotional responding.

Based on the expectations of the rebound hypothesis, it was further anticipated that there would be greater self-report and psychophysiological responding to subsequent negative affective material and the opposite effect for subsequent positive affective material. The current research did not confirm these predictions; instead higher EA was associated with an inability to successfully down regulate response to later images in physiological terms despite reporting feeling less.

The current findings can be contrasted with those of Billotti (2006), who identified higher psychophysiological responding but no difference in self-report among state acceptors across image types. Again Billotti's (2006) results highlight the distinct effect of trait compared to state EA paradigms.

The reduction in self-reported emotion to images of both negative and positive valence found in this experiment may be associated with an experience of global 'numbing' that is reported in many cases of PTSD (Litz, Orsillo, Kaloupek & Weathers, 2000). Future research should however establish whether this pattern of responding to

emotional images is unique to high trait avoiders following trauma exposure or whether it remains when not previously exposed to traumatic material.

4.1.2.4 EA in relation to subsequent memory and trauma-related intrusions.

The hypothesis that increasing levels of EA are associated with a higher number of trauma-related intrusions draws upon the predictions of DRT (Brewin et al., 1996) and the findings of Cochrane et al. (2004). The former would suggest that high avoiders encode their memories for a trauma using their SAM system, and the latter would argue that this is because such avoiders 'use up' their VAM in attempts to suppress the traumatic experience. Contrary to expectations, no association was identified, suggesting that higher EA does not have negative consequences in this regard. These results can be contrasted with those of Billotti (2006) who identified that acceptors reported more intrusions but found these less distressing.

Consistent with the emotion process model (Gross, 1998), it was further anticipated that increasing levels of EA would be linked with greater impairment in episodic memory for the trauma film. This was based on the theory that attentional resources would be directed toward suppression rather than to the processing of presented material. In contrast to the results of Billotti (2006), the hypothesis was not supported.

One explanation for these findings is that the suppression of negative material does not have cognitive consequences for memory or intrusions where that suppression is conducted at a trait level. In this regard, trait EA may have become automatic and may therefore not 'use up' attentional resources that would otherwise be directed towards the material observed, nor, at least in the case of a non self-referent trauma analogue, draw

excessively on the VAM system. This possibility would however run contrary to the findings of the Cochrane et al., (2004) paper and further research would therefore be of benefit.

4.2 Summary.

In summary, the current paper supports theoretical and clinical approaches which suggest that trait EA has a negative impact in the context of trauma (e.g. Follette, Palm & Pearson, 2006; Hayes et al., 1996). The findings provide some general support for an affective rebound hypothesis which is similar in nature to the thought rebound proposed by Wegner et al. (1987). They further provide partial support for DRT, since the ongoing physiological arousal associated with higher EA may be linked to the hyperarousal symptoms of PTSD and indicative of a strengthened implicit or SAM trace. Such a trace should however lead to increased intrusions along with negative mnemonic consequences, yet these latter predictions were not met.

The Billotti (2006) research used an identical method to the current work within the context of state EA but the results were highly dissimilar. This may reflect the relative newness of the field and the need for further replication, but may also underline that state suppression, flexibly applied within the context of trauma, may be a more beneficial form of emotion regulation, whereas trait suppression rigidly applied in this same context may be counterproductive.

4.3 Methodological considerations.

The current study has a number of methodological limitations. These influence extension of the findings to the wider population. Perhaps the central issue in this regard is representation of the range of EA.

As CBU volunteers, all participants had expressed prior interest in experiments which would range in the demands they placed upon them. This may reflect a bias toward openness to experience among the volunteer group. The nature of this particular experiment may further have resulted in a degree of self-selection among participants. Indeed 18% declined to attend, reporting 'apprehension' as their primary reason. Many of these individuals may have higher trait EA and their exclusion from the study could partially account for the paper's lower than average AAQ sample mean.

In light of these difficulties, steps were taken to draw participants from the extremes of the EA continuum, however this proved impractical. There was nevertheless one participant who scored higher on the AAQ than her peers and as such was identified as an outlier. Since there was no reason to consider her an anomaly, she was retained in the study so as to avoid further narrowing of the AAQ range. Crucially, this individual showed a much greater negative response to the trauma induction, consistent with the study's hypotheses. Where her influence was reduced, the reduction in PANAS positive affect from week one to two became non-significant, and the increase in BDI became a trend, as did the residual distress during the recovery period. All other findings were not affected.

A holistic view of the results reveals the overall negative effect of EA on mood and psychophysiological responding after trauma exposure. The three analyses that reduced in their significance after accounting for the high avoider concur with this

general picture. It can therefore be argued that inclusion of the outlier's actual AAQ score is legitimate and furthermore, that a clearer cost of EA would have been identified with a sample more representative of such high avoiders. The current study would therefore benefit from replication with participants at the upper end of this trait EA spectrum.

4.3.1 Power.

The power analysis conducted for the current project suggested a sample size of 67. On reflection, this number of participants was ambitious for a study with this timescale, particularly given the substantial commitment required from each volunteer (attendance for a minimum of two and a half hours across two visits, or one visit and subsequent telephone contact, and completion of a diary in the intervening week).

Considerable effort was made to engage a sufficient number of participants. In the first recruitment phase, 88 potential volunteers completed the AAQ questionnaire (Hayes et al., 2004) of whom 18 were appropriate (i.e. scoring in the upper or lower quartiles and unfamiliar with the video footage), and from whom 14 finally agreed to attend. In the second recruitment phase, a further 152 were telephoned, of whom 38 attended and of which data were available from 31.

The final sample size of 45 was nevertheless underpowered and this may affect the inferences that can be drawn from the results. It is however worth noting that the number of participants recruited is similar to the studies on which the current work builds. For example, Dunn (2004) achieved a sample of 44, while Billotti (2006)

recruited 42. The current project also obtained a 100% follow-up rate, which is unusual even in well-funded research trials and adds strength to the findings.

It is further worth noting that the study contained sufficient numbers to detect a large effect size (N>30) and, following the rationale of Dunn (2004), such an effect may be necessary for EA to have clinical utility as a concept. Indeed null findings in the existing work may more closely reflect the relatively narrow range of EA obtained rather than the sample size achieved. Replication of the project with more participants is however advisable and may identify clearer and potentially more generalisable consequences of EA in the context of trauma processing.

4.3.2 Design issues.

The key analyses in this paper were based on a correlational design. Hence, the statistical associations identified can not imply causation. Indeed, it is possible that the relationship between EA and mood or psychophysiology is confounded by some unknown third variable. For example, higher avoiders may not choose to view distressing images in their daily lives (e.g. hospital television dramas) and hence their responding may be associated with the unusualness of this material for them. Furthermore, Gross and John (2003) identified that high trait emotional suppressors have poorer social support. This could have influenced their experiences in the intervening experimental week, resulting in a reduction in their mood. It is not possible to be exhaustive in terms of the possible confounding factors; it is however worth noting the strength in the current findings, which are drawn from a clear theoretical base that is suggestive of causal links between EA and subsequent responding.

In addition to potential confounds, the presence of moderating or mediating variables cannot be discounted (for example, rumination may qualify the relationship between EA and response to the traumatic material). However, the current study did not explore this area since there was a lack of clear apriori predictions as to the variables involved.

Finally, transformation of the variables ensured the data met the main assumptions of a regression. However, one of the significant findings (change in BDI from week one to two) was based on data with non-normal residuals. This result therefore needs to be interpreted with caution and replication would be advisable.

4.4 Clinical implications.

Broadly speaking, the current findings suggest EA does not reduce negative affect during trauma and may lead to longer-term affective rebound. In this regard EA functions similarly to safety behaviours in anxiety presentations, since the use of avoidance aims to down regulate emotion and is thereby reinforced, but ultimately leads to greater negative emotional responding. One means of challenging such a safety behaviour is through the non-judgemental acceptance of experience (or lower EA) (e.g. Hayes et al., 2003). This strategy involves recognising thoughts and emotions as transient mental events, thereby experiencing them as less distressing and reducing the need to avoid. The idea of altering the struggle with emotions has been promoted within ACT, which encourages the patient with trait EA to modify this by learning to label emotions and to tolerate distress. It has further been extended specifically to work with PTSD wherein it is believed that sufferers need to accept and incorporate the experience of trauma into their understanding of themselves in order to live a valued life (Follette et

al., 2006). Such approaches may be particularly beneficial to those PTSD sufferers who apply trait EA strategies.

4.5 Conclusion.

The three main symptom groups in PTSD are hyperarousal, re-experiencing and avoidance/numbing. This research has identified that EA may be somewhat associated with both hyperarousal and numbing and with a general increase in negative affect following trauma exposure. The characteristic does not however appear to be linked with mnemonic deficits nor re-experiencing.

This study is one of very few to attempt to further understanding of what takes place when processing trauma rather than inferring this retrospectively. It builds upon previous research of its kind in that it examines trait levels of the EA characteristic, allowing for a clear comparison with the effects of state emotion regulation. The results offer some support for the heuristic belief that acceptance of symptoms, rather than their avoidance, may be an important factor in the prevention and treatment of PTSD.

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Part 3: Critical Appraisal.

The aim of this project was to develop an empirical understanding of how trait experiential avoidance (EA) might lead to the development and maintenance of posttraumatic stress disorder (PTSD). The study followed an experimental design and compared healthy individuals across the range of trait EA in terms of their immediate and longer-term responses to a trauma analogue.

This appraisal shall present an extended discussion of the research findings, considering in greater detail issues of sampling and measurement. Clinical implications and directions for future investigation will also be explored and finally, reflections on the process of carrying out the project will be presented.

1. Issues of measurement and sampling.

1.1 Methodological decisions.

At the research planning stage the intention was to follow a two-group design. Hence participants were initially drawn from the extremes of trait EA, as measured on the AAQ (Hayes et al., 2004). However, this approach proved logistically unfeasible, since very few individuals were identified at the higher end of the EA spectrum. This was surprising given the norms reported in the measure's development (Hayes et al., 2004). Moreover, continued pursuit of high avoiders posed an ethical dilemma, since they tended to refuse participation, perhaps recognising the negative effect the material may have on them. It was therefore decided to target the entire range of EA and to carry out correlational analyses.

The proposed two-group design would have allowed greater simplicity in interpretation and, unlike a regression-based study, would not have assumed a linear

association between EA and PTSD-type responding. Furthermore, it would have been well placed to reveal whether the effects of EA manifest more clearly in extreme scorers, as would be suggested by the high EA outlier who responded to the trauma analogue in the negative manner predicted by the research hypotheses.

The selection of extreme groups has however been criticised as yielding potentially misleading results (MacCallum, Zhang, Preacher and Rucker, 2002) and, in relation to EA, as failing to capture the theoretical view that the characteristic is on a continuum (Feldner, Zvolensky, Eifert & Spira, 2003). In contrast, regression-based analyses acknowledge the continuous nature of the variable and provide greater power to identify existing relationships, in addition to avoiding loss of information about individual differences.

1.2 Sample characteristics.

The current study has some demographic limitations which may limit its generalisability. For example, the recruited sample was predominantly White British; hence the degree to which the results can be extended to members of Black and Minority Ethnic groups (BME) is questionable. Indeed, Gross and John (2003) identified that BME groups endorse greater habitual use of suppression than White groups, indicating that this form of emotion regulation may serve a different function or have a different meaning depending on culture.

In addition, the sample contained approximately two-thirds women. Research has identified that females tend to self-report greater amounts of emotion (Barrett, Robin, Pietromonaco & Eyssell, 1998) and this may again have influenced the results.

However, the inclusion of gender as a primary dependent variable in hierarchical linear regressions did not influence the subjective reporting of emotional experience within this study. Further replication with a broader demographic base of participants would nevertheless be beneficial.

1.3 Selection of measures.

With the exception of the AAQ (Hayes et al., 2004), the measures used for this study were identical to those employed by Billotti (2006). This allowed for direct comparison of the impact of state and trait EA on trauma processing. The majority of the measures had good reliability and validity (see empirical paper) and much of the non-standardised material had been employed successfully in previously published research (cf Davies & Clark, 1998; Holmes, Brewin & Hennessy, 2004). Inevitably, however some of the measures raised methodological concerns and may have influenced the research findings. These shall each be considered in turn.

1.3.1 Analogue trauma induction procedure.

Film clips are a reliable method of eliciting emotions in a laboratory context (e.g. Gross & Levenson, 1995). However, the ecological validity of using a video to induce a trauma analogue can be questioned as there is a notable distinction between witnessing an actual trauma and viewing one on screen. Indeed, a number of participants commented that the footage was of poor quality and that this reduced their sense of 'immediacy' in viewing, while others described being accustomed to horrific images on the news and hence believed they were less affected by the induction procedure. A formal record was not made of participants' spontaneous responses to the film, it is

however possible to speculate that those who described themselves as 'feeling less' may be higher in trait EA.

In defence of the video's limitations, it is clearly unethical to expose participants to severe and personally salient traumatic material. It is also beneficial to have a standardised induction when examining the impact of a particular characteristic (i.e. EA) across participants. Furthermore, published research has used identical footage and discovered noteworthy results (e.g. Holmes et al., 2004). It nevertheless remains necessary to apply caution in generalising the current findings to the consequences of EA in a personally-experienced traumatic event.

1.3.2 Trauma Memory Assessment.

In the current study, no association was found between EA and memory for the traumatic event. This may partially be a result of limitations in the memory assessment measures. Indeed, their devisors recognise that they may be insufficiently sensitive to uncover differences in recall and recognition memory (Holmes et al., 2004). I would extend this possibility to argue that they may also lack the sensitivity to identify memory differences across the trait EA range.

One means through which the memory assessment might be improved would be to include a measure of situationally accessible memory (SAM) in terms of the imagery associated with trauma-related intrusions (e.g. Brewin, Dalgleish & Joseph, 1996). This could be achieved by testing participants' recognition of visually presented 'snapshots', only some of which are drawn from the original trauma analogue. Such tapping of the SAM system may distinguish trait avoiders with greater ease, since they should perform better on this type of assessment than on an examination of their autobiographical or

'verbally accessible' memory. The addition of such a measure would however have logistic disadvantages compared to a more straightforward pen and paper assessment, and there would be no comparative data available.

1.3.3 Completion of an Intrusions Diary.

The use of a seven-day diary to assess intrusions is a further potential limitation of the current study since there is no means of examining the validity of the recorded material. The data may also be susceptible to demand effects, as evidenced in the fact that a number of participants 'apologised' at follow-up for not having experienced more intrusions.

These limitations may have influenced the lack of significance in reported intrusions found in this paper. However, in defence of their use, diaries have been regularly employed in psychological research and therapy and provide a more accurate assessment than retrospective recall at follow-up. Furthermore, the intrusions recorded generally involved specific details of the trauma analogue (e.g. "the dead man being thrown into a metal coffin") and are hence very similar to those present in clinical PTSD (Ehlers and Steil, 1995).

1.3.4 Psychophysiological measurement.

The current research involved recordings of galvanic skin response (GSR) and heart rate (HR), as these are less sensitive to demand effects than self-report measures. HR was however excluded from the results as no meaningful variation was identified. This reflects the complexity of psychophysiological recording in emotional functioning. A particular problem in this regard is the frequent lack of correspondence between self-

report and physiology, which makes it difficult to determine exactly which aspect of individual experience physiological changes represent. A further issue, specific to the current work, relates to whether physiological measures taken during the pre-trauma rest period represent a true baseline or whether they are influenced by anticipatory anxiety. As the experiment involved a video procedure, presentation of a neutral film image rather than a blank computer screen, may actually have served as a better change comparison. It is nevertheless worth underlining that the psychophysiological procedures applied in the current work compare favourably with those employed in published research (e.g. Campbell-Sills, Barlow, Brown & Hoffman, 2006; Sloan, 2004).

2. Clinical Implications of the study.

The findings of the current research may be relevant to the therapeutic approaches offered to clients with symptoms of posttraumatic stress. Tentative suggestions could also be made to inform the advice given to high-risk populations such as emergency service personnel (ESP) regarding the management of their emotions during initial trauma encoding.

When considering the real-world implications of the current study, it is essential to bear in mind that the findings are laboratory based and entail a large degree of experimental control which will constrain the extent to which they can reveal genuine clinical implications. In relation to ESP in particular, it is crucial to note the very different target population and the limitations in applicability the current study may have in this regard. The following section shall consider each of these two groups in turn.

2.1 EA as it informs clinical work in PTSD.

Cognitive-behavioural approaches to PTSD have a solid and increasing evidence base (Ehlers et al. 2003; Foa, Keane & Friedman, 2000) which argues that the meaning a person attaches to a trauma shapes their affective experience and mediates the development of symptoms. Within therapy, the focus is on changing the content of cognition rather than the individual's relationship to it, and a central aspect of treatment is exposure, since trauma survivors are noted to actively avoid situations, thoughts and emotions associated with the event (Palm & Follette, 2000).

The current study recognises that avoidance has a negative impact on functioning post-trauma and therefore that exposure, as a means of breaking the avoidance cycle, would be of benefit. There are however a number of barriers to effective employment of this therapeutic technique which may be greater in individuals with a more diffuse trait EA characteristic that entails avoidance of all negative internal experience, be it trauma related or not. These include deficits in distress tolerance and in emotion regulation, and dissociation under stress, each of which have each been associated with poorer response to therapy (Chemtob, Novaco, Hamada & Gross, 1997; Cloitre, Koenen, Cohen & Han, 2001). According to Follette, Palm & Pearson (2006), one means of overcoming these would be to encourage trauma survivors to come into contact with painful memories, thoughts and emotions and to reduce avoidance during exposure through mindfulness, or the non-judgemental acceptance of internal experience. This approach is linked with low EA, and finds some support in the current study which identified that lower ratings on this characteristic may be associated with a less negative impact following trauma processing.

The use of mindfulness has been incorporated into Acceptance and Commitment therapy (ACT) where patients are encouraged to make non-evaluative contact with here and now events on the understanding that this will increase their ability to make contact with previously avoided private difficulties, such as trauma memories (Hayes, Strosahl and Wilson, 1999). Follette et al., (2006) do however acknowledge that evidence for the mechanism through which mindfulness enhances exposure techniques in trauma remains largely theoretical. The findings of the current study add some limited empirical support to their approach, suggesting that reduced EA may be linked with less affective rebound, hyperarousal and emotional numbing. However, some of the associations identified were small and may not be clinically meaningful. Further research is therefore necessary to add weight to these preliminary hypotheses.

2.2 EA and the work of Emergency Service Personnel.

Emergency Service Personnel (ESP) rescue, heal and comfort the survivors of trauma on a regular basis and as such they frequently work within the context of strong emotion. According to Wastell (2002), ESP must actively suppress this emotion in order to carry out their duties effectively. He argues that this process can result in their developing an entrenched defensive style, the long term effects of which are psychologically, physically and socially harmful. Lengthy service within the emergency sector has indeed been found to be predictive of PTSD-like difficulties. Chang et al. (2003), for example, found that rescue workers with more years of experience were at higher risk of developing PTSD, arguably because they were more likely to have been exposed to traumas in the past and to be carrying residual symptoms from previous rescue work. Mitchell (1983) further noted that ESP show rigid and more primitive

defences after attending a number of call-outs and that their presentation at these times is often consistent with PTSD.

The aforementioned papers also highlight particular aspects of emotional suppression which may have a negative impact. Wastell (2002), for example, identified that withdrawal and acting out were the largest predictors of stress in this professional group, while Chang et al. (2003) found that distancing and escape-avoidance were significant risk factors for post-traumatic morbidity. Both of these studies were cross-sectional and self-report based, and varied in reporting individual ESP responses to a single major catastrophe (an earthquake) or to a series of call-outs. The use of suppression was however consistently presented as a necessary, although perhaps unhealthy, part of emergency service work.

Assuming that the current project could be extended to the ESP population; the findings would imply that application of trait EA by ESP during trauma would do little to reduce their subjective and physiological experience of emotion and, in accordance with Wastell (2002) and Mitchell (1983), may increase their experience of low mood and emotional numbing in the context of later call-outs. The Billotti (2006) research would further suggest that state EA, flexibly applied, could have less negative consequences and may successfully reduce the experience of fear during trauma exposure. The need for flexibility rather than rigidity in the application of EA may therefore be central to resilience in the highly stressful emergency services context. The distinction between the participants tested and ESP is however substantial, hence the accuracy of these suggestions would be best considered by replicating the experiment with emergency service workers and establishing whether similar patterns of responding are identified.

2.3 Summary.

The study of ESP has broadly concluded that suppression is necessary for effective emergency service work; it has however noted that this regulation strategy can have long-term costs for the employee in the form of PTSD-like psychological difficulties. The current research and that of Billotti (2006) would suggest that inflexibility in the use of EA may be an aspect of these problematic consequences.

Additional work with individuals presenting to clinical services with PTSD has identified that the avoidance or control of internal experience is predominant in their presentation. Much therapeutic practice therefore emphasises the value of tolerating negative private experience for long-term emotional well-being (Follette et al., 2006). The current research has added some support to these findings, suggesting that, post-trauma, lower trait experiential avoiders may fair somewhat better than higher. The research is however limited by a high degree of experimental control. At this early stage in the understanding of EA and PTSD, laboratory designs are warranted, however there is benefit to be derived from future work taking a more ecologically valid, field-based approach.

3. Future Directions.

This project raises a number of questions which further study could explore. For example, it would be worthwhile establishing whether PTSD can develop in the absence of EA or indeed whether there is a particular threshold of EA after which PTSD-like difficulties arise. Furthermore, the assumption that EA is on a linear continuum with suppression and acceptance as bipolar opposites has not been empirically examined. It

would therefore be worth considering whether there is any degree of independence between these constructs.

The applicability of the current research has been considered above and it has been suggested that future work could take a more field-based focus. With this in mind, an assessment of EA could be introduced into clinic-based research. This would allow consideration of whether EA is associated with the emergence of particular PTSD symptoms, and may further assist in the identification of clients who respond better to certain therapeutic approaches. For example, Feldner, Zvolensky, Eifert and Spira (2003) identified that high avoiders showed greater anxiety when instructed to suppress rather than accept while the converse was true for high acceptors. This would suggest that certain clients may find acceptance techniques difficult to adopt and stressful as a result.

An examination of the varying impact of degrees of EA on subsequent PTSD among ESP may also be of theoretical and practical interest. In practical terms such research could examine whether trait high or low experiential avoiders fare differently in emergency service work and whether the emotion regulation techniques employed by habitual suppressors or habitual acceptors are especially helpful or unhelpful at the time of initial trauma encoding.

4. Reflections on the process of completing the thesis.

The current research involved presenting volunteer participants with distressing material. For ethical reasons it was therefore necessary to explore their current psychological functioning and potential trauma history. Each participant had given their informed consent to this part of the research. However, I found certain aspects of this

questioning difficult since a number of volunteers disclosed material which was evidently distressing to them. I believe that my clinical experience was largely of benefit in this context, it was however necessary to remain aware of the boundaries of the research situation and to ensure that I did not encourage extensive exploration of the disclosed material as this would have been both unnecessary for the project and uncontaining for the participant.

In addition, the central research video was distressing in nature and, at times, I found it problematic exposing participants to this. It was a particular struggle where they withdrew or reported high levels of distress, and this lead me to balance the costs and benefits of such research in my mind. This is an intrinsic difficulty in trauma-based studies and at these times, the importance of sensitive debriefing was paramount.

I was further struck by the range of responses to the video that I witnessed, which stemmed from clear disturbance and a need to terminate the experiment to relief that the footage "wasn't even as bad as normal television". This reminded me of the need to follow clear ethical guidelines and to ensure that participants had as good an understanding of the nature of the film as possible prior to commencing the experiment. With regard to these guidelines however, the provision of informed consent may well have restricted the range of EA achieved in the study, since high avoiders tended to opt out, therefore limiting the conclusions that could be drawn.

5. Conclusion.

The current study is one of the first to examine the impact of trait EA both during and after exposure to a trauma analogue. It was broad in design, considering a range of PTSD-related symptoms and drawing on existing theoretical understanding of the

condition in order to make its predictions. Unlike much existing EA work, it further included both psychophysiological and self-report data and had the benefit of a 100% follow-up rate. It was however limited by the sample upon which it was based, which was smaller than anticipated and tended to be lower on the EA continuum. Extension of this paper could therefore benefit from careful, ethically considered, recruitment of higher experiential avoiders.

6. References.

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Appendix A

Copy of original ethics approval letter

UNIVERSITY OF CAMBRIDGE

CAMBRIDGE
PSYCHOLOGY RESEARCH
ETHICS COMMITTEE

Application No: 2003.15

Dr B Dunn
MRC Cognition & Brain Sciences Unit
15 Chaucer Road
Cambridge CB2 2EF

Dear Dr Dunn

The Cambridge Psychology Research Ethics Committee has given ethical approval to your research project: **Consequences of Emotion Regulation When Processing Traumatic Material** as set out in your application dated June 2003. The Committee attaches certain standard conditions to all ethical approvals. These are:

(a) that if the staff conducting the research should change, any new staff should read the application submitted to the Committee for ethical approval and this letter (and any subsequent letter concerning this application for ethical approval);

(b) that if the procedures used in the research project should change or the project itself should be changed, you should consider whether it is necessary to submit a further application for any modified or additional procedures to be approved;

(c) that if the employment or departmental affiliation of the staff should change, you should notify us of that fact.

Members of the Committee also ask that you inform them should you encounter any unexpected ethical issues. If you would let us know that you are able to accept these conditions, I will record that you have been given ethical approval.

Yours sincerely

KS Douglas
G:\Ethics\I'SI'RES\tlpprovals\Dunn_ 1503.doc/mrb

Old Press Site, Silver Street
Cambridge CB3 9EW
Telephone: 01223 766894
Fax: 0 1223 .332355

Email confirmation of ethics approval amendment for current research.

Dear Dr Dunn

Consequences of emotion regulation when processing traumatic material

I am pleased to be able to inform you that the Psychology Research Ethics Committee has given approval to your request for the collection of additional data using a slightly altered methodology as described in your letter dated 11 April 2006.

Also noted are the two additional students who will be helping with the data collection for this study and your amended details.

Yours sincerely
Margaret Benton
(on behalf of Karen Douglas)

School of the Biological Sciences
17 Mill Lane
Cambridge
CB2 1RX

The consequences of habitual emotional suppression when processing traumatic material.

Please read the information below to decide if you would like to take part in this project:

What is the purpose of the study?
The aim of the study is to investigate if the way people manage their thoughts and feelings when they experience a traumatic event effects how much they remember about the event and how they feel about it afterwards. This is important because it may help us understand what makes some people go on to develop posttraumatic stress disorder (PTSD) when they experience traumatic events, and possibly lead to the development of new therapies for the condition.

Why have I been asked to take part?
You are being asked to take part so we can see how healthy volunteers respond to different ways of processing mildly traumatic material.

What will I have to do?
If you decide to take part, it will take up to two hours to complete the experiment. This will take place over two sessions at the Cognition and Brain Sciences Unit, 15 Chaucer Road, Cambridge, at a time of your convenience. We will reimburse your travelling expenses for getting to and from the unit and give you £5 an hour for your time.
In the first session you will be asked to watch a film about the aftermath of road traffic accidents. The content of the film includes the emergency services working to extract trapped victims, injured victims screaming, dead bodies being moved, and body parts among car wreckage. We will measure your emotions during the film, your memories about the film, and your response to a set of emotional pictures after the film. Some of these pictures may be unpleasant, including images of people crying, frightening animals, and decaying food. We will measure your emotions in terms of what you describe, how much your heart rate changes, and how much you sweat through the finger tips. We do this by placing a small number of electrodes on your fingers which most people find comfortable to wear.
After the first session we will ask you to keep a diary for one week, recording whether or not you had any thoughts about the film each day and how it made you feel. This should take up to ten minutes to complete each day.
In the second session we will review your diary and ask you to complete some questionnaires measuring your thoughts and feelings.

Are there any risks in taking part?
All of the tasks we will ask you to complete and equipment we use have been used safely in previous research. You may, however, find the film we ask you to watch upsetting. For this reason, we do not think anyone who currently has or previously had a mental health condition (for example, clinical depression or clinical anxiety) should take part in the study. If you become upset during the film we will stop the experiment and you will have the opportunity to talk to a clinical psychologist about your reaction if you wish to.

Other information

This study has received ethical approval from the Ethics Committee of the University of Cambridge. The data we collect will be used in the strictest confidence, and no identifying information will be stored with it, to safeguard your confidentiality. The data will be kept in a locked filing cabinet, which only the investigators will have access to. Results from the study will be presented at conferences and written up in journals. Results will be presented in terms of groups of participants, so individual data will not be identifiable.

You are free to decide not to take part in the study and can withdraw at any time and for whatever reason. You do not need to explain your reasons to us if you do not want to.

If you have would like any further information about the project please contact Louise Quarmby or Dr Barney Dunn by phoning 01223 355 294.

Thank you for reading this information sheet.

CONSENT BY VOLUNTEERS TO PARTICIPATE IN A STUDY ENTITLED:

The consequences of habitual emotional suppression when processing traumatic material.

I.....

Of.....

.....

hereby fully and freely consent to participate in the above study. I understand and acknowledge that the trial is designed to add to medical knowledge. I note that I may withdraw my consent at any stage in the investigation and I acknowledge that the purpose of the trial, the risks involved from any procedures, and the nature and purpose of such procedures have been explained to me by:

.....

and that I had an opportunity to discuss these matters with him/her.

I have received a written explanation of these matters, a copy of which is attached to this form. I understand that I may change my mind and withdraw from the study at any time without this effecting my rights.

Signed.....

Date.....

I confirm that I have explained to the volunteer the nature and effect of these Procedures.

Signed.....

Date.....

Place.....

Appendix B

Instructions for trauma analogue.

You will now move onto the test film. This will show real life video footage of the aftermath from five road traffic accidents, which you are likely to find upsetting. It is important for the experiment that you watch the film, but if you become so distressed that you wish to stop the film let the experimenter know by saying 'stop' and we will terminate the experiment. Remember to pay attention to the film and do not look away from the screen, as we will ask you questions about it afterwards. After the video we will ask you to rate how you are feeling. Press the button below when you are ready to begin.

Video tape commentary

Scene 1.

After a sudden rain storm, several collisions occurred at one spot on the motorway due to the slippery conditions and bad visibility. Eight people died, and one of these four died before they could be taken to hospital. Here is a 21-year old woman who was trapped in her car. Unfortunately she died before she could be taken to hospital. The baby survived the accident. The parent, 26 and 30 years old, also died during the accident.

Scene 2.

Here a 58-year old man skidded onto the wrong side of the road because he was driving too fast around a corner. He hit a minibus which was coming the other way, and the occupants, a 51-year old woman and her adult daughter, were both injured. The daughter was knocked unconscious but received only cuts and bruises. By the time this video was taken, the man and the older woman, both severely injured, had been trapped in their vehicles for over an hour, since because of the remote location ambulance and fire crews took 20 minutes to reach them. The woman was permanently disabled by her injuries, due to spinal cord damage, although the man did recover completely.

Scene 3.

These two men were involved in a multiple pile up on the motor way. Their wives, who were sitting in the back of the car, survived the accident although they sustained major injuries. Both men had grown up children who were still financially dependent on them.

Scene 4.

This 56-year old man and his 52-year old wife were on the way to visit their son, a student, in a near by town when their car went out of control on the motorway after one

tyre was punctured. They skidded and crashed. The woman died shortly after the accident as a result of the injuries she received. The man remained conscious throughout the accident, although he had suffered extremely severe injuries. However, he was trapped in the car next to his wife and it proved too difficult to rescue him in time. He died of internal bleeding about 30 minutes after the accident, and could only be removed from the wreckage when he was already dead.

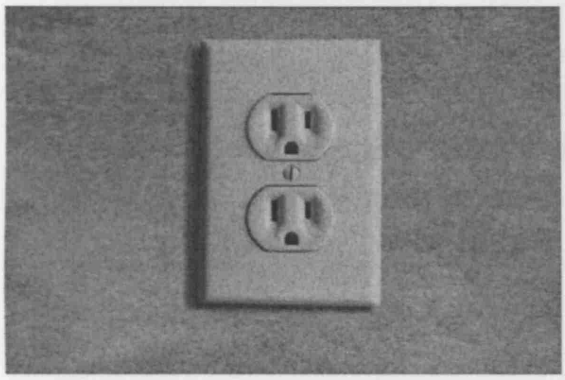
Scene 5.

This woman, a 20-year old student, and her friend, were on the way to Italy in a car during the summer. On a major road they drove straight into the rear of a traffic jam going round a blind corner. Both women were not hurt by this. However, a lorry which they had overtaken earlier also came round the corner and hit them from behind. Both women suffered very serious injuries. The student sustained massive internal injuries, an injured skull and deep cuts to her face. The lorry driver was not hurt.

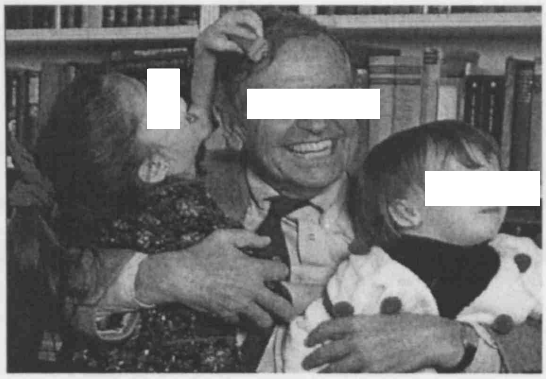
Instructions for Affective Picture Task

In this task we are interested in how people respond to pictures that represent different events that occur in life. You will be asked to look at photographs on the computer screen and rate how they make you feel. There are no right and wrong answers and we would like you to be as honest as possible. We will give you no particular instructions about how we would like you to control your emotions – please just view the images as you normally would. We are interested in how you actually feel, rather than how you think you should feel. Some of the pictures may be upsetting, similar to images you may see in television news broadcasts. We will ask you to rate how you feel using the same scales as in the video task. Please remember to rate all emotions on each of the sliders. After you have rated the picture, there will be a break of a number of seconds before the next picture is shown. We will begin with three practice trials. Please click the button when you are ready to start.

International Affective Picture Scale – Example pictures for each emotion.



Neutral



Happiness

Sadness

Fear

Disgust

Visual Analogue Scale.

Example visual analogue emotion scale presented after each picture from the International Affective Picture Scale as well as at the end of each video scene and at pre and post video viewing. (The actual scale was programmed in Microsoft Visual Basic and presented on the computer).

Right at this point in time, how much are you feeling the following emotions (please mark a point on the line from 0 not at all to 100 very much so).

HAPPINESS	0----	-----	-----	-----	-----	50--	-----	-----	-----	-----	-100
SADNESS	0----	-----	-----	-----	-----	50--	-----	-----	-----	-----	-100
FEAR	0----	-----	-----	-----	-----	50--	-----	-----	-----	-----	-100
DISGUST	0----	-----	-----	-----	-----	50--	-----	-----	-----	-----	-100
DISTRESS	0----	-----	-----	-----	-----	50--	-----	-----	-----	-----	-100

Instructions for Intrusions Diary

Volunteer Number:

Date:

Experimenter and their contact details:

An important part of the experiment is measuring whether people's memory is influenced by how they control their emotions when they view traumatic material. To assess this we would like you to complete a daily diary saying whether you have experienced any spontaneously occurring intrusions about the road traffic accident film you have just watched. By intrusions, I mean memories (thoughts or images) of the video that suddenly pop into your mind spontaneously. I do not mean times when you deliberately think about it or mull it over in the diary. Please carry the diary around with you, and if you notice yourself having an intrusion about the film please fill it in. If you forget or are too busy at that time, please try and fill it in as soon as possible afterwards.

The diary is divided into four periods: morning (when you wake to 12), afternoon (12 to 6pm), evening (6pm to when you go to bed), and night (when you go to bed till you wake). Please fill in for each time period for each day. In Colum 1 indicate what number intrusion it is for that time period. In Column 2 please say whether it was a thought (words in your mind), an image (a picture in your mind), or a combination of the two. In Column 3 very briefly describe the content of the intrusion (for example, a fire engine driving up the road). In Column 4 rate how distressing the intrusion was, ranging from 1 not at all distressing to 100 very distressing. This process should take no more than a minute to complete for each intrusion. If you do not have any intrusions during a time period, please place a 0 in the column. Please use one diary sheet per day. If you cannot fit all the intrusions for one time of day into the space provided, please continue on another sheet. On the back of this sheet is an example of a completed diary for one day to help clarify the process.

EXAMPLE OF DIARY

R of write for no ut a 0	Was the intrusion as **IMAGE** (I) **THOUGHT** (T) or **BOTH** (IT)	**CONTENT**: please describe briefly the content of each intrusion	How **DISTRESSED** were you by the intrusion (0 = not at all to 100 = extremely)
	I + T T	Fireman pulling baby out a car Blanket over injured man	75 50
	I T I	Overturned burning car Women being ventilated Fire engine arriving at the scene of a crash	61 52 30

Cued Recall Memory Test.

Please answer these questions about the film you watched last week:

The questions are difficult so don't worry if you're not sure, just put down your best guess.

1. What colour was the car that was on fire in a field, by a tree, at the beginning of the first scene?
2. What part of a body did you see sticking out of the upside down car in the first scene?
3. What was in the blanket that the man wearing the cap and long coat was carrying at the end of the first scene?
4. What colour was the t-shirt worn by the middle-aged woman trapped in the mini-bus in scene two?
5. When the woman was finally cut out of the mini-bus and placed on a stretcher, which parts of her body was/were cut and bleeding in scene two?
6. In scene two, once they got the man out of the car onto the stretcher, what did they do to him?
7. What part of the injured man's body was zoomed in on in scene two?
8. In scene three, a body was still in a car covered by a stripy blanket. What body part did you see hanging out from under the blanket?
9. What kind of vehicle had the mangled car from the above question crashed into?
10. In scene four, what colour was the car that had its roof cut off in order to remove the dead?
11. How many doctors in white coats were shown at the scene of the accident in scene four?
12. How many people were put in coffins in scene four?
13. In the final scene, what was the female student receiving medical attention wearing?
14. In the final scene, what part of the female student's body was bandaged by the paramedics?
15. Can you remember any other medical procedures that were performed on the injured girl?

Recognition Memory Test

For each statement indicate whether you believe the event occurred in the film by answering Yes or No.

Scene 1

a) The baby in the blanket is passed to a paramedic and placed in an ambulance.

b) An upside down car is focused on and a paramedic manipulates a naked leg which is sticking out.

c) A team of fireman race to a car that is on fire and spray foam on it in order to quench the flames.

d) A distraught teenager is led away from the scene by a member of the public.

e) Three members of the public help the emergency personnel carry a body to the side of the road

Scene 2

a) A woman being cut out of a crashed vehicle cries out, and appears to lose consciousness.

b) When the man with the injured leg is on the stretcher the paramedics shine a light into his eyes.

c) A team of firemen attach metal equipment to the front of the minibus to pull the wreckage away from the woman's legs.

d) A policeman stands watching the wreckage whilst making notes on a clipboard.

e) When the man with the injured leg is on the stretcher the paramedics cut his trousers and reveal a bloody wound.

Scene 3

a) A body which had been covered by a blanket inside a wrecked car is removed and placed on the ground. Two blankets are then laid over it.

b) Rescue workers put up a yellow and blue police incident tape in order to keep the crowd back from the scene.

c) Before covering a man's body with a blanket, the fireman closes the man's eyes.

Scene 4

a) Emergency personnel use cutting equipment to remove the body of a man from a beige car who has been crushed in the driver's seat.

b) A fireman struggles to release the trapped woman's seatbelt.

c) A bent car number plate lies on the ground close to the coffin the man is placed in.

d) Two men lift up two bodies and bundle them into metal coffins.

Scene 5

a) A female student is moaning as she is treated in an ambulance. She is naked and electrodes are attached to her chest.

b) A paramedic injects the female student in her right arm, whilst the others attend to her injuries.

c) As her head is bandaged, a relative arrives at the ambulance and is kept to one side by paramedics.

Appendix C

Experimental Protocol.

Session One.

- Screening for exclusion criteria (PTSD and other mental health problems)
- Brief intelligence measure.
- Questionnaires examining mood over the past week and trait emotional coping strategies.
- Attachment of electrodes for measurement of heart rate (HR) and Galvanic Skin Response (GSR).
- 2 minute rest period for baseline physiological measures.
- Trauma induction video (accompanied by self-report measures of emotion).
- 2 minute rest period for further physiological measurement.
- Presentation of affective images (accompanied by self-report measures of emotion).

Intervening week.

- Daily completion of diary, recording re-experiencing symptoms of trauma induction video.

Session two.

- Review of diary findings and diary compliance rating.
- Questionnaires examining mood over past week.
- Questionnaires examining recognition and recall memory for the trauma video material.
- Experiment debrief.

Appendix D

Data Transformations for the variables reported in the empirical paper.

The following variables were log transformed to reduce the influence of outliers (where necessary) and to make the variable normal:

- Self-reported negative emotion at pre-video viewing.
- Self-reported distress at post-video viewing.
- Variability in GSR pre, during and post video viewing.
- GSR to IAPS images.
- Number of intrusions reported in seven-day diary.

The following variables were inverse transformed to reduce the influence of outliers (where necessary) and to make the variable normal:

- PANAS negative emotion in week one and week two.
- STAI in week one and week two.

The following variable was squareroot transformed to reduce the influence of outliers and to make the variable normal:

- Self-reported positive emotion to neutral IAPS pictures.

The following variable was log transformed. This reduced the influence of outliers but failed to make the variable normal, analyses with this variable should therefore be interpreted with caution.

- BDI in week one and week two.